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CHEMICAL SOIL INVESTIGATION REPORT FOR THE WELDON SPRING CHEMICAL PLANT/RAFFINATE PITS, PHASE II

For The :
Weldon Spring Site Remedial Action Project
Weldon Spring, Missouri

Prepared By MK-Ferguson Company

AUGUST 1989 **REV. 0**

U.S. Department Of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

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Prepared By:

MK-FERGUSON COMPANY
AND
JACOBS ENGINEERING GROUP, INC.
Route 2, Highway 94 South
St. Charles, Missouri 63303

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ABSTRACT

This report presents data and interpretations from the Phase II Chemical Soil Investigation at the Weldon Spring Chemical Plant/Raffinate Pits. This investigation was performed to provide data in support of the Remedial Investigation and Baseline Risk Assessment.

The investigation consisted of both biased and unbiased sampling programs designed to detect contamination from previous operations. Very small amounts of nitroaromatic compound contamination were detected in former ordnance production areas. Metals and inorganic anion contamination was observed in numerous locations related to both explosives and uranium production. Small amounts of semi-volatile organic, pesticide, and PCB contamination were also detected. No volatile organic contamination was observed.

The data collected in this investigation was of sufficient quality and quantity to characterize the on-site chemical soil contamination. Additional investigations may be required to support remedial design.

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1 INTRODUCTION

The Weldon Spring Site (WSS) has a varied history dating back to 1941 when the Department of the Army (DA) condemned over 17,000 acres and built the Weldon Spring Ordnance Works (WSOW). The WSOW produced trinitrotoluene (TNT) and dinitrotoluene (DNT) until 1945. The plant was idle until 1954 when the DA decontaminated and transferred 217 acres to the Atomic Energy Commission (AEC). The AEC constructed the Weldon Spring Uranium Feed Material Plant (WSUFMP) on this land.

The WSUFMP converted processed uranium and thorium ores into metals from 1956 until 1966. It was declared surplus in 1967. Later, a portion of the WSUFMP was transferred back to the DA for modification into a herbicide production facility. This facility was known as the Weldon Spring Chemical Plant (WSCP). Decontamination efforts began in several buildings, but no process equipment or chemicals were installed. The Weldon Spring Raffinate Pits (WSRP) remained in AEC custody throughout this decontamination effort.

In 1985, the WSCP was transferred to U.S. Department of Energy (DOE) custody and managed under the Surplus Facilities Management Program (SFMP). The current Weldon Spring Site Remedial Action Project (WSSRAP) was created in 1985 to effect final remediation of the site.

As a part of the overall environmental documentation process for the WSSRAP, a Remedial Investigation/Feasibility Study - Environmental Impact Statement (RI/FS) Work Plan was developed which provided a complete project description and discussion of the environmental setting. The RI/FS Work Plan detailed all investigations and analyses necessary to reach a Record of Decision.

This report presents the results of the Phase II Chemical Soil Investigation at the Weldon Spring Chemical Plant/Raffinate Pits (WSCP/WSRP). This investigation was performed in support of the overall Remedial Investigation (RI) for the WSCP/WSRP portion of the WSS.

1.1 PURPOSE

Previous studies have provided baseline information regarding chemical soil contamination. This investigation was designed to complete the chemical characterization of WSCP/WSRP soils. The information and interpretations presented in this report will be incorporated into the RI Report which will provide interpretation relating soil contamination to other contamination (i.e. groundwater, raffinate pits, etc.) and discuss the overall environmental conditions at the WSCP/WSRP.

1.2 SCOPE

This investigation was limited to the chemical soil characterization in the 217-acre WSCP/WSRP area. Radiological soil characterization has been addressed in a separate report (MKF, 1988b). In addition, off-site chemical soil contamination was not addressed in this investigation. However, contamination of drainages receiving runoff (and potentially contaminated sediments) from the WSCP/WSRP has also been discussed in a separate report (GSI, 1989).

The complete scope of the current investigation is presented in the chemical soil investigation sampling plan for the WSCP/WSRP (MKF, 1988a). The overall approach consisted of both biased and unbiased sampling programs designed to detect soil contamination from WSOW and WSUFMP processes and sources.

1.3 HISTORICAL RESULTS

Numerous historical sampling programs documenting soil contamination were evaluated in developing the sampling plan for this investigation. A detailed description of these previous programs and a discussion of data validity is available in the sampling plan (MKF, 1988a).

These previous investigations detected elevated concentrations of nitroaromatic compounds, inorganic anions, pesticides, polychlorinated biphenyls (PCBs), metals, and semi-volatile organic compounds. This historical information is included in the interpretations presented in Section 3. Table 1-1 is a summary of the historical investigations and a description of the results.

TABLE 1-1 Chemical Soil Investigations Historical Summary

Year	Sponsoring Agency	No. of Samples/ No. of Locations	Results
1975	Department of Army	28/27	Low levels (<1 ug/g) of nitroaromatic contamination detected.
1987	DOE - Phase I*	135/32	Inorganic anion and metals contamination detected.
1987/88	DOE - IRA **	150/30	Metals, inorganic anions, pesticides, PCBs and nitroaromatic compounds detected.

* MKF,1988d

** MKF, 1988c

2 SAMPLING PROGRAM

Chemical soil samples were collected from the 245 locations shown in Plate 1. The rationale for sample collection is described in detail in the sampling plan (MKF, 1988a). Due to the complexity of the historical events which led to the development of this plan, the reader is urged to review the rationale contained in the sampling plan before attempting interpretation of the results presented in this report.

The overall soil investigation consisted of one unbiased and two biased sampling programs. The biased programs were designed to detect contamination from the WSOW and the WSUFMP processes. Sampling locations for the biased programs are designated by the A-(WSUFMP) and C-(WSOW) series boreholes. Unbiased sampling locations comprise the D-series boreholes. Background samples were collected from the B-series boreholes.

To aid in interpreting the results and data presented in this report, two plates have been prepared to provide additional information. Plate 2 shows 1954 topography, WSOW buildings, and sampling points to present the areas sampled and the rationale behind each location. Plate 3 displays all Phase II sampling locations on a cut and fill map. The following subsections describe actual sample collection, sampling equipment decontamination, and sample preservation.

2.1 SAMPLE COLLECTIONS

Soil sampling locations were surveyed to establish horizontal and vertical control prior to sampling. Soil samples were collected using conventional hollow-stem augers and continuous sampling equipment advancing ahead of the augers. The continuous samplers provided samples two inches in diameter and 60 inches long. This sampling method provided minimally disturbed samples for chemical analysis and lithologic logging.

After the continuous sampler was advanced and removed from each borehole, sampling personnel opened the sampler in an area shaded from direct sunlight (to prevent photolytic decomposition of nitroaromatic compounds) and scanned the soil for volatile organic and radiological contamination. A geologist then prepared a lithologic log and divided the sample into the required sample intervals. Sampling personnel thoroughly hand-mixed the sample to ensure that a representative sample was collected. All samples were composited in stainless steel pans using stainless steel spatulas. Samples were collected into precleaned sample containers supplied by metaTRACE, Inc., the primary analytical laboratory. Sample containers were labeled with preprinted labels and sample chain of custody was initiated. Sampling personnel wore new disposable latex gloves while collecting each sample.

All A, C, and D series boreholes were grouted to the surface on the same day as drilled using a high-solids bentonite grout designed to form a semi-plastic low-permeability seal. The B-series boreholes, located on the Weldon Spring Wildlife Area, were not grouted, but were backfilled with auger cuttings. These locations were sampled to provide background data on metals and inorganic anions. Chemical contamination was not expected in this area, so sealing the boreholes was not required. Drill cuttings were collected from each location and placed in the Ash Pond area.

Field conditions required some modification of the actual sampling plan. The primary changes consisted of changes in borehole depth due to rubble and/or auger refusal and slight shifts of some locations due to access problems such as overhead power lines, concrete pads, footings, and foundations. All changes were noted in the field notebooks and have been incorporated into this report.

Surface samples were collected at select sampling locations using a bucket auger.

2.2 SAMPLING EQUIPMENT DECONTAMINATION

Sampling equipment, including augers, continuous samplers, drill rods, spatulas, stainless steel pans, and working areas of the drill rigs, was steam cleaned prior to beginning sample collection and upon completion of sampling. Augers, tools, and drill rods were steam cleaned between boreholes. Continuous samplers, spatulas, pans, and bucket augers were steam cleaned between samples. This equipment was then rinsed with toluene, followed by a double hexane rinse. All rinse solvents were collected. The collected solvents evaporated, eliminating the need for disposal. The sampling equipment was allowed to air dry prior to use. No lubricants were used on the sampling equipment.

2.3 SAMPLE PRESERVATION

Soil samples were preserved by placing the filled sample containers in coolers with frozen blue ice. The samples remained chilled throughout sample collection and shipping to the laboratory. No additional preservation techniques were employed.

3 ANALYTICAL RESULTS AND INTERPRETATIONS

This section presents the results and interpretations of the chemical soil characterization analyses. Each group of analytical parameters is discussed separately in the following subsections. Soil samples were analyzed for combinations of the following parameters: nitroaromatic compounds, inorganic anions, metals, pesticides, polychlorinated biphenyls (PCBs), semi-volatile and volatile organic compounds, and miscellaneous. A complete description of the soil sampling and analytical program may be found in Appendix A.

3.1 NITROAROMATIC COMPOUNDS

Nitroaromatic compounds are potential soil contaminants from Weldon Spring Ordnance Works (WSOW) processes. The C-series boreholes represent the WSOW biased sampling program. The uppermost samples from the unbiased D-series boreholes were also analyzed for nitroaromatic compounds to detect contamination in areas not suspected to have been affected by WSOW processes.

Areas sampled for nitroaromatic compounds include WSOW process areas, drainageways, the burning area, and rubble areas. The WSOW biased sampling program (C-series boreholes) consisted of 76 locations with 285 total samples analyzed for the following nitroaromatic compounds: 2,4,6-Trinitrotoluene (TNT), 2,4-Dinitrotoluene (2,4-DNT), 2,6-Dinitrotoluene (2,6-DNT), 1,3,5-Trinitrobenzene (TNB), 1,3-Dinitrobenzene (DNB), and Nitrobenzene (NB). An additional 96 samples from the random sampling program were also analyzed for nitroaromatic compounds.

Nitroaromatic compounds were detected at the six locations shown in Figure 3-1. The depth intervals and contaminant

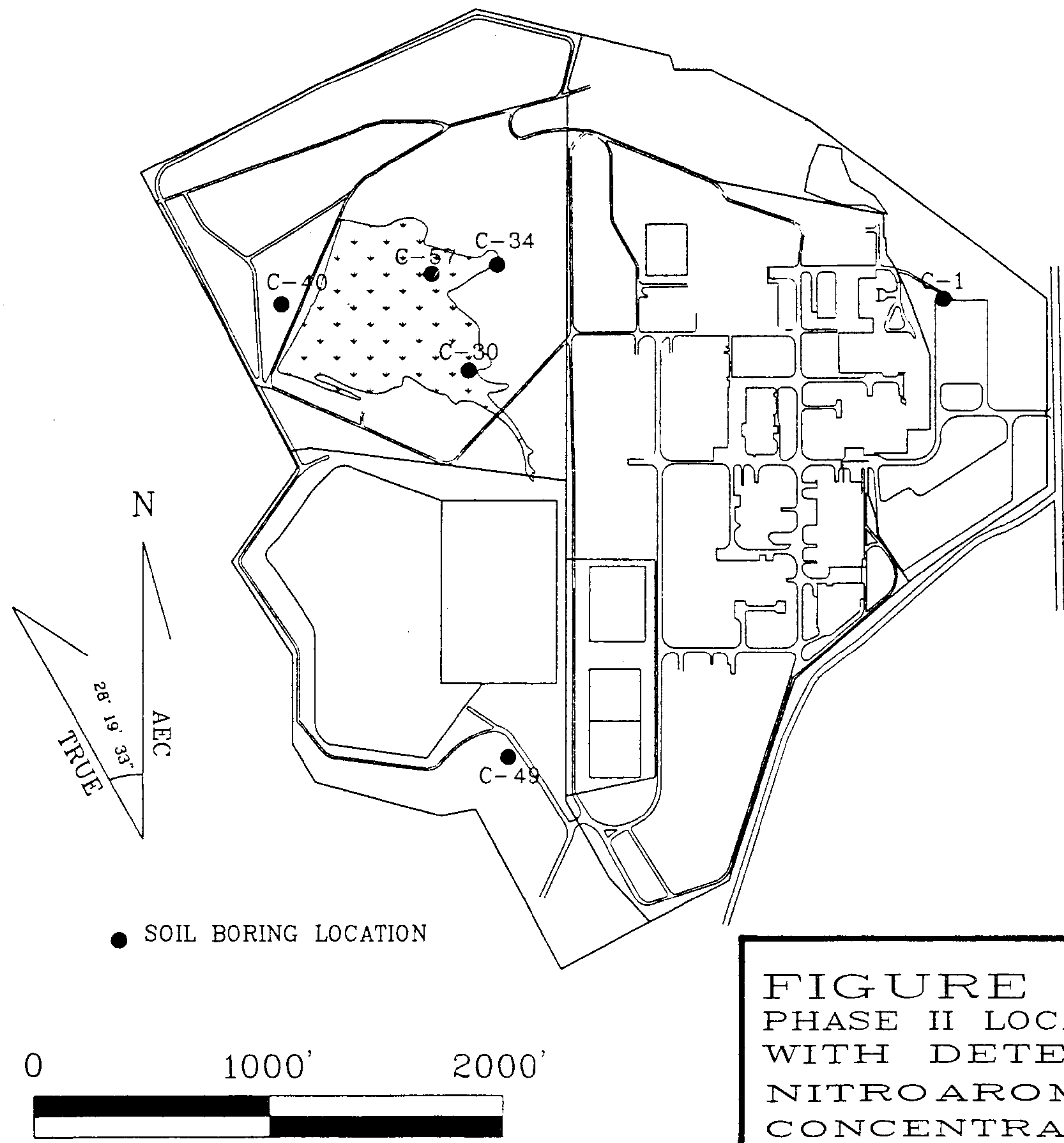

FIGURE 3-1
PHASE II LOCATIONS WITH DETECTED NITROAROMATIC CONCENTRATIONS

DWG NUMBER W0001

TABLE 3-1 Detected Nitroaromatic Compounds in WSCP/WSRP Soils

BOREHOLE NUMBER *	COORDINATES WEST	COORDINATES NORTH	DEPTH INTERVAL ft.	2,4,6-TNT	2,4-DNT	2,6-DNT	1,3,5-TNB	1,3-DNB	NITROBENZENE
			DETECTION LIMITS - ug/g	1.2	0.75	1.41	0.57	0.9	1.44
C-1	49370	100740	6 - 8	ND	ND	ND	2.31	ND	ND
			8 - 10	ND	ND	ND	1.88	ND	ND
			10 - 12	ND	ND	ND	1.66	ND	ND
C-30	51400	100450	4 - 6	27.56	ND	ND	ND	ND	ND
			6 - 7	2.34	1.84	ND	5.66	ND	ND
C-34	51280	100890	2 - 4	ND	ND	ND	1.19	ND	ND
C-40	52200	100725	8 - 10	6.34	ND	ND	ND	ND	ND
			12 - 14	2.38	0.58	ND	ND	ND	ND
C-49	51225	98775	4 - 6	ND	3.17	ND	1.88	ND	ND
			6 - 8	ND	6.31	ND	1.70	ND	ND
			8 - 10	ND	0.95	ND	ND	ND	ND
C-57	51565	100850	4 - 6	ND	ND	1.73	ND	ND	ND

Concentration - ug/g

TNT - TRINITROTOLUENE
DNT - DINITROTOLUENE
TNB - TRINITROBENZENE
DNB - DINITROBENZENE

* See Figure 3-1

concentrations are presented in Table 3-1. The locations with detected nitroaromatic concentrations were all WSOW biased sampling locations and generally confirm previous results which indicated that the Ash Pond Area is contaminated with low levels of nitroaromatic compounds (DA, 1976).

The contaminated areas are associated with primary TNT production areas and/or wastewater. The source of contamination at each location and probable extent of contamination is discussed in the following paragraphs.

Location C-1 is located in the Wash House Area of TNT Production Line No. 1 (Plate 2). Gross contamination has been observed in similar settings on the adjoining Weldon Spring Training Area (WSTA) (Campbell, 1987). The contamination probably originated as wastewater spilled on the soil from the Wash House Building (1-T-13). Gross contamination in this area was apparently removed during decontamination efforts prior to construction of the feed material plant (WSUFMP) facilities in about 1954. The depth to contamination (6 to 12 feet) is consistent with cut and fill mapping which indicates the presence of 4 to 6 feet of fill overlying WSOW topography. Construction and subsequent removal of building foundations would have provided disturbed soil conditions allowing migration to the depths where contaminated levels are indicated.

Location C-30, which has the highest concentration of nitroaromatic compounds, and location C-40 are located near wastewater settling tanks on TNT Production Line Nos. 2 and 3, respectively (Plate 2). These settling tanks collected particulate material (primarily TNT) from the wastewater generated in washing TNT crystals. These tanks reportedly overflowed frequently (Fishel and Williams, 1944) as wastewater lines clogged. The contamination probably originated from the spilled wastewater and/or from settling tank cleaning operations. The extent of contamination in these areas is controlled by WSOW topography which shows that the settling tanks were located near natural drainageways. The contamination is present in the soil below the fill placed over WSOW topography, as expected.

Location C-34 yielded a 1,3,5-TNB concentration of 1.19 µg/g in the 2 to 4 foot interval. This depth is consistent with cut and fill mapping which indicates the presence of 2 feet of fill (Plate 3). This borehole is located in the final production area of TNT Production Line No. 2. The probable source of this low-level contamination is the Grainer House (2-T-19 on Plate 2) and associated wastewater. The extent of this area of contamination is very limited since the numerous samples collected nearby did not indicate contamination.

Additional nitroaromatic compound contamination was detected at location C-49 which was drilled at the location of the Trinitrating House of TNT Production Line No.4 (4-T-9). The nitroaromatic compound contamination was observed at depths 4 feet below ground surface which corresponds with the amount of fill at that location.

The final location with nitroaromatic compound contamination is borehole C-57 which detected 1.73 µg/g of 2,6-DNT in the 4 to 6 foot depth interval. This borehole is located near a WSOW wastewater line. This contamination probably originated either as leakage from the wooden wastewater lines or as spillage when the wastewater lines were removed. Low-level contamination is potentially present along all old WSOW wastewater ditches. Gross contamination and wastewater lines were removed during the decontamination effort before the plant was transferred to the control of the Atomic Energy Commission (AEC) in 1954.

The results of all nitroaromatic compound analyses indicate the absence of gross nitroaromatic contamination in the chemical plant and raffinate pits (WSCP/WSRP) soils. Low-level contamination is present in isolated areas. No significant sources of nitroaromatic compounds were detected on the site. All boreholes in which nitroaromatic compounds were detected are from the WSOW Biased Sampling Program. No nitroaromatic compounds were observed in the random sampling program. This supports the sampling program design and indicates that major contaminated areas were detected by the biased sampling.

3.2 INORGANIC ANIONS

Elevated inorganic anion concentrations were observed at the WSCP/WSRP areas in previous investigations. Numerous potential sources exist for this contamination. Both the WSOW and the WSUFMP used nitric and sulfuric acids in their processes. Spills and routine discharges provided mechanisms for nitrate, nitrite, and sulfate soil contamination. The WSUFMP also used hydrofluoric acid which provided a potential source for fluoride contamination. A total of 920 samples collected from 243 boreholes was analyzed for nitrate, nitrite, sulfate and fluoride.

An important consideration in evaluating inorganic anion concentrations in soils is the naturally occurring levels present in the soils at the WSCP/WSRP. Previous inorganic anion soil data was statistically evaluated and on-site background concentrations were determined in the Interim Remedial Action (IRA) soils report (MKF, 1988c). Samples collected during this investigation from an area unaffected by WSOW and WSUFMP processes were also analyzed for inorganic anions. These off-site data were used to establish the validity of the earlier statistical background determination in the IRA soils report. In Table 3-2, the on-site background concentrations calculated

TABLE 3-2 INORGANIC ANION STATISTICAL BACKGROUND EVALUATION

*COMPOUND	ARITHMETIC MEAN ONSITE mg/Kg	ARITHMETIC MEAN OFFSITE mg/Kg	GEOMETRIC MEAN ONSITE	GEOMETRIC MEAN OFFSITE	STANDARD DEVIATION ONSITE	STANDARD DEVIATION OFFSITE	ASSIGNED UPPER BACKGROUND LIMIT* mg/Kg	COEFFICIENT OF VARIATION
NITRATE	2.5	6.3	1.1	4.1	2.0	6.6	19.5	104.8
SULFATE	33	34	23	25	27	25	84	73.5
FLUORIDE	7.7	6.5	6.3	5.5	4.3	3.9	14.3	60.0
NITRITE	NC**	ND+	NC**	ND*	NC**	NC**	0.5	NC

* Assigned upper background limits were calculated as the arithmetic mean for off-site location plus two standard deviations.
** Not calculated
ND+ Not detected - detection limit 0.5 mg/Kg

SOURCE: MKF, 1988c

from the earlier data are compared to the off-site background concentrations as determined by the B-series borehole samples.

On-site and off-site background levels are similar. The only significant discrepancy is the average background nitrate concentration. Off-site samples indicated slightly higher background nitrate concentrations than on-site samples. Therefore, the upper limit of background nitrate concentrations was raised slightly to include this condition. The upper limits of background inorganic anion concentrations are presented in Table 3-2. These concentrations will be used to evaluate the analytical data in this section.

The coefficient of variation (CV) was calculated for each anion from the background locations. The average CV for inorganic anions is 79%, slightly above the 65% CV assumed in determining the number of random samples. This average CV is compared to the average CV for metals in Section 3.2

Each anion detected at elevated concentrations is discussed separately. Nitrite was not observed at elevated concentrations in WSCP/WSRP soils. All inorganic anion data is presented in Appendix B.

3.2.1 <u>Nitrate</u>

Nitrate contamination is present at the WSCP/WSRP from both WSOW and WSUFMP sources. Figure 3-2 presents soil sampling locations with elevated nitrate concentrations. Nitrate data from soil sampling locations are presented in Appendix B.

The highest nitrate concentrations were observed in sampling locations D-49, D-64, D-70, D-80, and D-84 which are located adjacent to the raffinate pits. The raffinate material typically exhibits very high nitrate concentrations (MKF, 1988f).

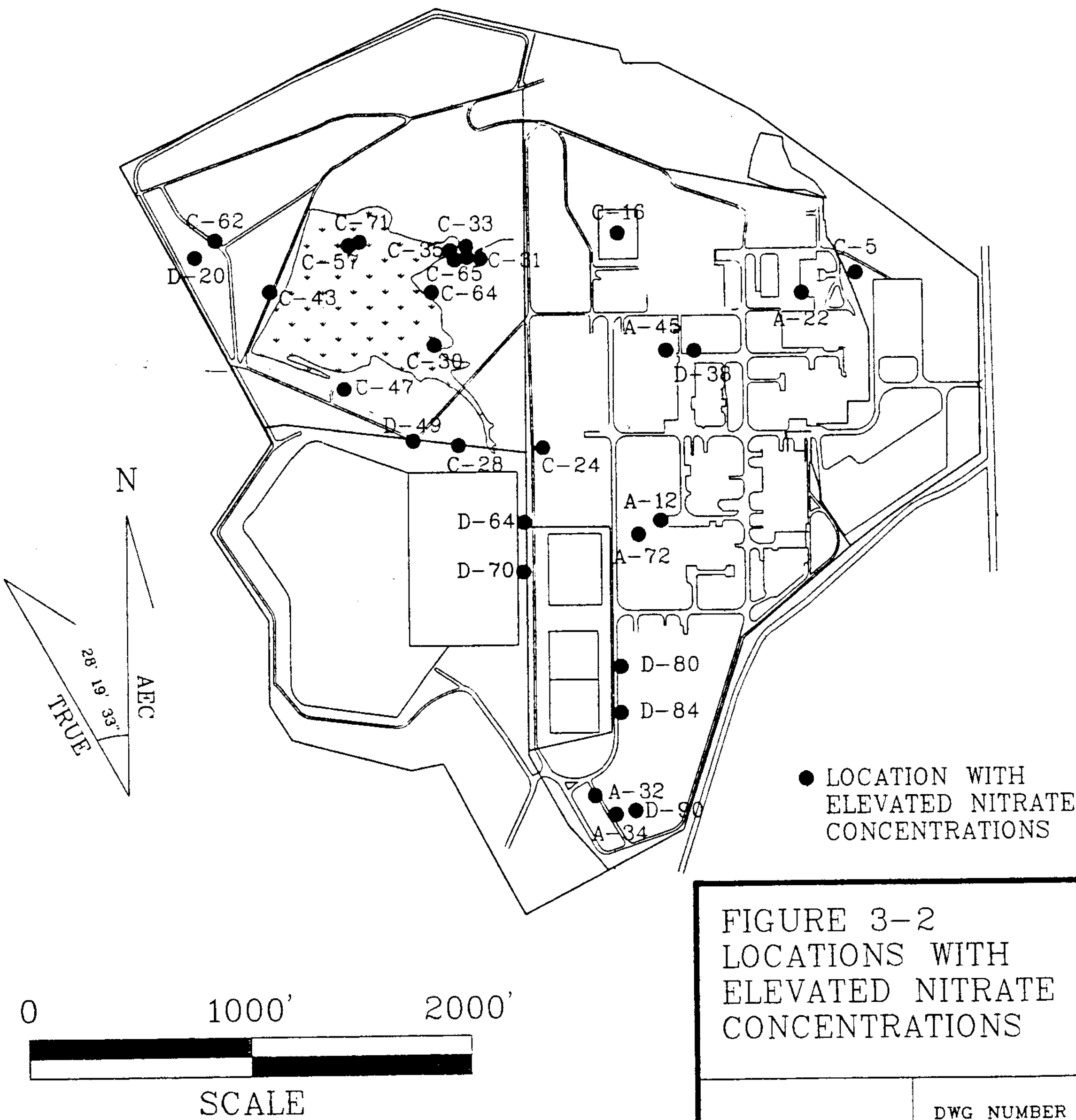

FIGURE 3-2
LOCATIONS WITH
ELEVATED NITRATE
CONCENTRATIONS

DWG NUMBER W0001

Water containing highly mobile nitrates and seeping through the unsaturated soil zone is the probable source of this contamination. The presence of elevated nitrate concentrations in the soil at a portion of the sampling locations adjacent to the pits indicates that the soil underlying and immediately adjacent to the pits contains significant quantities of nitrates. It may also indicate preferred migration pathways from the pits.

Elevated nitrate concentrations were also observed in the Ash Pond area at locations C-28, C-30, C-31, C-33, C-35, C-43, C-47, C-62, and D-20. Many locations exhibited nitrate concentrations less than two times the upper limit of background. These locations are not discussed further because of their limited horizontal and vertical extent and low concentrations of nitrates.

Locations C-33, C-34, and C-35 all exhibited nitrate contamination in the 0 to 2 foot sample interval. The maximum concentration, 726 µg/g, in this area was observed at location C-35. The source of this contamination is the final production area of TNT Production Line No. 2. Acidic wastewater was generated in this area. Spills, leaks, and possible other discharges provided a release mechanism for this contamination.

Nitrate and sulfate contamination was also observed in locations C-62 and D-20 at depths of 0 to 2 feet and 8 to 10 feet, respectively. These samples were collected in a WSOW rubble area containing concrete rubble and soil. During WSOW decontamination efforts in 1953-54, contaminated rubble and material were removed to the Ash Pond area and flashed (burned) to destroy nitroaromatics. This decontamination method would not destroy inorganic anions such as nitrate and sulfate. Therefore, nitrate and sulfate soil contamination is to be expected in WSOW rubble areas.

Elevated nitrate concentrations were observed in the soil near Buildings 435 and 436. Locations A-32 and A-34 exhibited slightly above background concentrations in surface (0 to 1 foot) samples. This contamination is probably related to WSUFMP usage of these buildings. The 8 to 15 foot interval at location D-90 contained 427 µg/g nitrate. The source of this contamination is not known.

Five locations in the WSCP area indicated elevated nitrate concentrations apparently related to WSUFMP sources. Locations A-12, A-22, and A-72 exhibited slightly elevated nitrate levels at depths to 4 feet. The contamination source is probably spilled materials at these locations. The extent of contamination in these areas is also probably limited to a small area as indicated by results from adjacent boreholes.

Two sampling locations, A-45 and D-38, exhibited elevated nitrate concentrations in areas suspected to be contaminated. These locations are near the nitric acid recovery area and the digestion/denitration buildings, respectively. Spills, leaks, and other discharges from these areas provided a contamination source. The extent of contamination to the west is limited as indicated by results from other sampling locations. The extent of contamination to the east is not as well defined due to the presence of Building 105 and large concrete-covered areas. However, the locations sampled most likely represent "worst case" locations, and significant contamination of soils underlying concrete is not likely.

Another location, C-16 (under the coal pile), contained elevated nitrate levels in the 20 to 22 foot sample interval. This location was sampled to evaluate a WSOW drainageway from TNT production areas (Plate 2). Apparently, nitrate-containing wastewater flowed down this drainageway and contaminated the soil. WSOW decontamination efforts apparently removed the gross contamination since samples from locations C-14 and C-15 (located in the same drainageway) did not indicate elevated nitrate concentrations.

The final area of nitrate contamination is the wash house area (1-T-13) of TNT Production Line No. 1. Nitrate contamination is present at locations C-1 and C-5 at depths of 6 to 10 feet and 8 to 10 feet, respectively. These depths correspond to the approximate amounts of fill present at each location. Based on the results from these and other nearby locations, this contamination is limited in both horizontal and vertical extent and represents residual contamination remaining after WSOW decontamination efforts.

Previous investigations documented the presence of elevated nitrate concentrations in a WSOW drainageway from Building 1-T-9 (MKF, 1988c,d). This contamination appears to be limited to the immediate vicinity of the ditch and does not appear to impact groundwater.

Elaluation of nitrate soil contamination leads to three conclusions: (1) the soils underlying and adjacent to the raffinate pits contain the highest nitrate concentrations on the site and could represent a source of continuing groundwater contamination after the pit water and raffinate is removed, (2) other areas of nitrate contamination do not pose significant sources of groundwater contamination, and (3) biological usage of nitrate has probably reduced the extent and magnitude of nitrate contamination, especially in surface and near-surface soils.

3.2.2 Sulfate

Sulfate soil contamination is fairly widespread across the site, with concentrations exceeding the upper limits of background (see Table 3-2) observed at 72 sampling locations. Numerous locations exhibited sulfate concentrations slightly above background. Due to the number of locations with elevated sulfate concentrations and the variety of sources, the WSCP/WSRP area has been divided into quadrants to aid in data interpretation. Figure 3-3 displays the division of the WSCP/WSRP into quadrants identified as Ash Pond, WSRP, WSCP-North, and WSCP-South and shows sampling locations with elevated sulfate concentrations.

ASH POND

The Ash Pond Area contained 23 sampling locations with elevated sulfate concentrations. The analytical data from all locations is presented in Appendix B.

The sulfate contamination in the Ash Pond Area appears to have originated generally from WSOW sources. Locations C-29, C-30, C-31, C-36, C-38, C-40, C-44, C-45, C-46, C-47, C-52, C-62, C-63, D-20, D-22, D-27, D-35, and D-42 are located in or near WSOW areas that produced wastewater. The WSOW used mixed nitric and sulfuric acid to nitrate toluene (sulfuric acid acted as a catalyst). Wastewater generated during the purification process typically contained sulfate and sulfonated compounds (MKF, 1988a). Contamination at these locations is generally restricted to the intervals directly underlying fill areas. Concentrations range from 109 µg/g at location C-40 to 285 µg/g at location C-29.

Locations C-62, C-63, C-64, C-65, C-67, D-20, and D-29 are associated with WSOW rubble. The highest on-site sulfate concentrations, 2,554 µg/g and 1,401 µg/g, were observed in samples collected from small rubble piles at locations C-65 and C-67, respectively. Other WSOW rubble areas exhibited much lower concentrations (no greater than 2 1/2 times background).

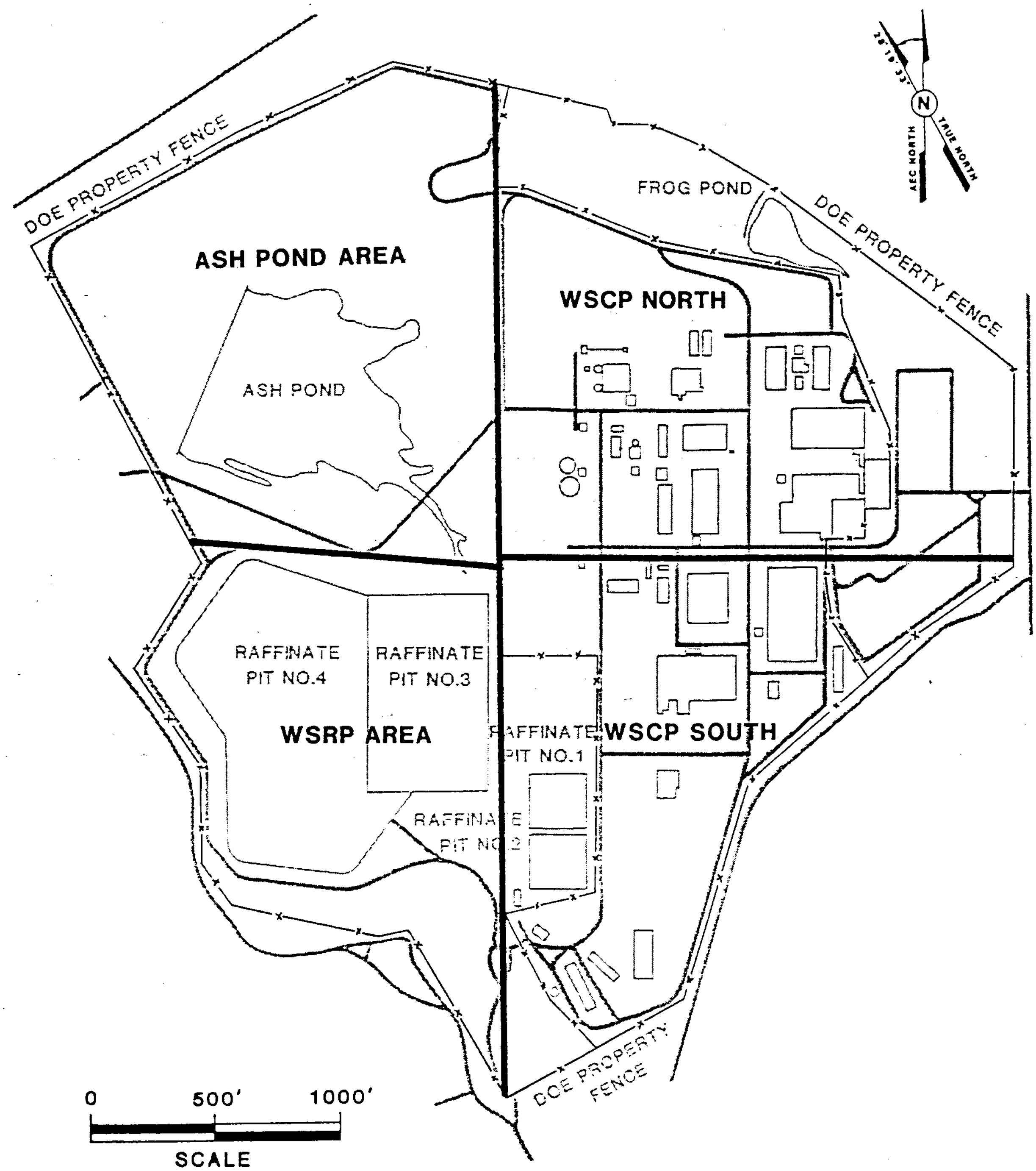

FIGURE 3-3

AREAL DIVISION OF WSCP/WSRP

In general, the sulfate contamination in the Ash Pond Area is low and the horizontal extent moderate. Several isolated areas of higher concentrations are present. The low concentrations do not appear to represent a significant source of groundwater contamination.

Since most sulfate contamination is present in subsurface soils, and given the small area of surface contamination, surface runoff is probably not affected by this contamination.

WSRP

Elevated sulfate concentrations were detected at ten locations in the WSRP area. Six locations immediately adjacent to Raffinate Pit 4 and one location adjacent to Raffinate Pit 3 exhibited sulfate levels ranging from 101 µg/g at location D-48 to 286 µg/g at location D-68. This low-level contamination was observed in the upper 7 feet of soil. The raffinate pit wastes also contain sulfates. However, the lack of sulfates in deeper samples at these locations indicates that Raffinate Pits 3 and 4 are not the source of this contamination. The probable source is sulfate contaminated soil moved from WSOW process areas now underlying the raffinate pits prior to or during their construction.

Groundwater in this area also contains elevated sulfate concentrations. Since the soil contamination does not persist vertically through the soil profile in areas adjacent to the pits, it is believed that soil sources outside the pits do not significantly contribute sulfate to the groundwater. Soil underlying the WSRP may be contaminated, given the WSOW processes that occurred under the pits.

The remaining locations, C-49, C-50, and C-53 are located at WSOW building locations. This contamination originated as wastewater from WSOW processes. The contamination appears to be limited in areal extent and restricted to the upper 5 feet of soil. Concentrations range up to 1,407 μg/g.

Sulfate data from all areas is presented in Appendix B.

WSCP - North

Sulfate contamination was detected at 24 locations in the north WSCP area. Locations C-2, C-5, C-5, C-12, C-13, C-20, C-23, C-42, D-18, and D-33 exhibited contamination resulting from WSOW sources. Samples from locations C-2, C-5, and D-33 contained contamination from the Wash House area of TNT Production Line No. 1. Locations C-23 and C-24 contained contamination from the Wash House area of TNT Production Line No. 2. This pattern is consistent with the Wash House area of TNT Production Line No. 3. Sulfate concentrations ranged from 132 μg/g at location C-2 to 1,808 μg/g at location D-18. Contamination from WSOW sources was present at depths below the corresponding amount of fill present at each location.

At location C-6 contamination was detected in a WSOW drainageway. This was expected as a previous investigation documented sulfate contamination uphill from this drainageway (MKF, 1988c). The extent of this contamination is very likely limited to the filled ditch area. Portions of this drainageway were removed during cut and fill grading.

Other WSOW contamination was detected at locations C-12, C-13, and D-18. These locations were sampled to detect contamination in the final production area of TNT Production Line No. 1. The extent of contamination is limited as indicated by the lack of sulfate contamination at adjacent sampling locations.

The source of elevated sulfate concentrations at location C-20 is the 2-T-11 Valve House (Plate 2). This contamination pattern is consistent with the Building 3-T-11 area. The extent of this contamination is also limited as indicated by the proximity of additional sampling locations in which contamination was not detected.

Elevated sulfate concentrations were detected in samples from five locations, C-15, C-16, C-17, C-18, and D-24, at the Coal Pile north of Building 401. Two potential sources for this sulfate contamination exist. Sulfur, originating as pyrite in the coal stored in the Coal Pile, is one potential source. Sulfate-contaminated fill may have also been used to construct the Coal Pile base. The other potential sulfate source is the WSOW drainage beneath the Coal Pile. Sulfate-contaminated wastewater may have contaminated soils in this drainage. Sulfate contamination patterns in the boreholes at the Coal Pile indicate that contamination is present from both sources. Surface and near surface samples typically contain sulfate at concentrations from 200 µg/g to 400 µg/g. This contamination exists throughout the Coal Pile and is directly attributable to the residual coal material remaining at the surface.

The remaining WSCP-North locations with elevated sulfate concentrations are related to either WSUFMP processes or WSOW contaminated soil used as fill over the majority of the area. Since no documentation of spills or other discharges exist, the source of this contamination is unknown. Sulfate concentrations are generally less than 300 µg/g. The contamination is also apparently limited in horizontal and vertical extent.

WSCP-South

Sulfate soil contamination was observed at 16 locations in the WSCP-South area. Seven of these locations, A-29, A-30, A-31, A-33, A-35, A-36, and D-91, are clustered in the southernmost portion of the WSCP around several WSUFMP support facilities. Sulfate concentrations are generally less than 200 µg/g. These elevated levels are present in subsurface samples, indicating contamination from WSOW fill sources rather than the equipment stored there.

The remaining nine locations are located around staging, loading, and unloading areas in the WSCP area. This contamination may have originated as small undocumented spills and/or as WSOW-contaminated fill.

3.2.3 Fluoride

Elevated fluoride concentrations were detected at two locations. Location A-47 contained 43.5 µg/g of fluoride in the uppermost sample. This borehole is located immediately adjacent to the hydrogen fluoride (HF) tanks. Spilled HF in this area is the apparent source of this contamination. The extent of fluoride contamination in this area is limited both horizontally and vertically, based on results from adjacent boreholes.

Fluoride contamination, 112 µg/g, was also detected in the 4 to 6 foot interval at location C-49. This location also contained elevated sulfate and nitroaromatic compound concentrations. The source of fluoride contamination is not known, but the extent appears to be limited as indicated by other sampled intervals and adjacent borings.

No other elevated concentrations of fluoride were detected in the WSCP/WSRP soils. Since fluoride source materials were not used extensively in WSCP operations, this was as expected.

3.3 METALS

WSCP/WSRP soils also contain naturally occurring levels of metals. These background concentrations must be distinguished from contamination when evaluating the analytical results. Statistically calculated background metal concentrations were determined during the Phase I Chemical Soil Investigation (MKF, 1988d). These on-site background concentrations are presented with the off-site background concentrations calculated from samples collected from B-series boreholes in Table 3-3.

The off-site background concentrations were calculated in the same manner as the inorganic anion data. The upper limit of the off-site background concentrations generally agree with the on-site background concentrations calculated in the Phase I Soils Report (MKF, 1988d). Slight variances were observed for several metals including: antimony, lead, potassium, silver, and zinc. These metals were observed in lower concentrations in off-site soils than in on-site soils. The upper limits of background established in Table 3-3 are used in the following discussions.

The coefficient of variation (CV) was calculated for metals from background locations. The CV averaged 48.2% for 17 metals compared to 79% CV for inorganic anions. The combined average CV of 51.4% is well below the 65% used to calculate the number of random samples. This indicates that sufficient samples were collected to adequately determine background concentrations and satisfy the statistical requirements detailed in the sampling plan.

As a result of the different potential metals present from the WSOW and the WSUFMP processes, samples collected from the biased programs were analyzed for different combinations of metals. Samples from the WSOW biased sampling program were

TABLE 3-3

BACKGROUND METALS CONCENTRATION EVALUATION

COMPOUND	ARITHMETIC MEAN ON-SITE	ARITHMETIC MEAN OFF-SITE	GEOMETRIC MEAN ON-SITE	GEOMETRIC MEAN OFF-SITE	STANDARD DEVIATION ON-SITE	STANDARD DEVIATION OFF-SITE	PHASE I UPPER BACKGROUND CONC.	UPPER BACKGROUND CONCENTRATIONS*	COEFFICIENT OF VARIATION
Al	12536	13500	13500	12500	4902	5200	27,700	23,900	38.5
Sb	29	NC	25	NC	8	NC	40	0	NC
As	6	6.7	6	6.1	4	2.9	15	12.5	43.3
Ba	161	208	145	165	70	151	390	510	72.6
Be	1	1.1	1	1.1	1	0.5	6	2.1	45.5
Cd	3	>1	3	>1	1	NC	7	>1	NC
Ca	3495	2770	3044	2630	1839	990	9300	4750	3.6
Cr	24	25	23	23	6	13	42	51	52.0
Co	16	12.2	14	9.6	7	12.2	40	36.6	100.0
Cu	15	15	14	14	6	5	34	25	33.3
Fe	18636	18300	17914	16800	5306	5400	35400	29100	29.5
Pb	29	17	25	15	16	10	84	37	58.8
Li	10	10.8	9	8.2	16	7.7	17	26.2	71.3
Mo	2437	1990	2256	1620	956	730	5900	3450	36.7
Mn	495	550	370	330	334	480	1400	1510	87.2
Hg	>0.1	>0.1	>0.1	>0.1	NC	NC	>0.1	>0.1	NC
Ni	19	16	18	16	7	5	43	26	31.3
K	757	NC	698	NC	311	NC	1701	0	NC
Se	>0.5	>0.5	>0.5	>0.5	NC	NC	>0.5	>0.5	NC
Ag	3	>1	2	>1	2	NC	13	>1	NC
Na	486	390	437	350	202	160	982	710	41.0
Tl	>1	>1	>1	>1	NC	NC	>1	>1	NC
V	35	34	34	33	7	9	54	52	26.5
Zn	45	35	39	33	29	17	220	69	48.6

* - Upper background concentrations were determined as the off-site arithmetic mean plus two standard deviations.

NC - Not calculated

analyzed for selected metals while samples from the WSUFMP were analyzed for the complete U.S. Environmental Protection Agency's Contract Laboratory Program (CLP) metals list. The uppermost random samples were also analyzed for the complete CLP metals list.

Due to the nature of the processes (acid usage) at the WSOW and the WSUFMP, metal soil contamination is likely. The processes at the two plants are distinct enough to warrant separate discussions. Random samples with elevated concentrations are discussed with WSUFMP and WSOW biased sampling programs where a relationship exists. The remaining random samples are then discussed separately. All elevated metal concentrations are presented in Appendix D.

WSOW METAL CONTAMINATION

The general WSOW process included the use of nitric and sulfuric acids. Many buildings used lead sheeting to reduce sparking. Investigations at similar facilities (West Virginia Ordnance Works) indicate the primary metal contaminant to be lead. Samples from the WSOW biased sampling program were analyzed for the following metals: aluminum, antimony, barium, iron, lead, magnesium, and manganese.

Limited amounts of metal contamination related to WSOW sources were observed. Elevated magnesium levels were observed at locations C-1, C-30, C-34, C-35, C-50, and C-8. Concentrations ranged from 5,990 µg/g at location C-1 to 21,537 µg/g at location C-34. All locations with elevated magnesium levels are in or near areas of WSOW wastewater production. The exact source of contamination is unknown but is probably related to acidic wastewater dissolving magnesium fittings and/or equipment. The extent of magnesium contamination is limited as indicated by results from adjacent samples and boreholes.

Barium was also observed at elevated concentrations at locations C-8, C-11, C-18, C-21, C-28, C-49, C-50, C-51, C-52 and C-54. Most elevated barium concentrations were slightly above to three times the upper background limit. Two locations, C-21 and C-52, yielded barium concentrations of 15,003 µg/g and 9,020 µg/g, respectively. Location C-21 is in the Wash House area (2-T-13) of TNT Production Line No. 2 (Plant 2). The source of this contamination is not known. The extent is limited to the 0 to 2 foot interval in this immediate area. Adjacent boreholes do not exhibit similar concentrations.

Location C-52 contained 9,020 µg/g barium in the 4 to 6 foot interval. The source is also unknown, but the extent is limited based on results from adjacent boreholes.

Numerous samples from the WSOW biased sampling program contained elevated aluminum concentrations. Locations C-16, C-18, C-21, C-22, C-25, C-31, C-32, C-40, C-49, C-50, and C-75 exhibited above background aluminum levels. These elevated concentrations were observed in areas generating or transporting acidic wastewater. Many aluminum concentrations were less than twice background. Background concentrations of aluminum in area soils range up to 27,700 µg/g, which is not unusual given the clay soils present. The slightly elevated aluminum levels are not sufficient to impact groundwater or surface water.

Lead, the expected primary WSOW metal contaminant, was observed at elevated concentrations in several areas. All elevated WSOW lead concentrations are presented in Table 3-4. Samples from the Wash House areas of TNT Production Lines 1 and 3 and Locations C-2, C-44, and C-47 exhibited lead concentrations of 138, 121, and 98 µg/g, respectively. The

TABLE 3-4

ELEVATED LEAD CONCENTRATIONS FROM WSOW SOURCES

BOREHOLE NUMBER	WSSRAP SAMPLE IDENTIFICATION EAST NORTH DEPTH	CONCENTRATION UG/G
C-2	S2-049425,100725-12.0,14.0	138.00
C-39	S2-052220,100750-2.0,4.0	180.23
C-41	S2-052116,100760-0.0,2.0	2369.88
C-41	S2-052116,100760-18.0,20.0	96.78
C-44	S2-051815,100360-2.0,4.0	121.52
C-47	S2-051800,100265-0.0,2.0	97.78
C-51	S2-051225,98825-0.0,2.0	254.15
C-57	S2-051565,100850-0.0,2.0	19272.96
C-60	S2-052400,101400-0.0,2.0	211.30

extent of lead contamination in these areas is limited as indicated by other sampled intervals and adjacent boreholes.

Surface drainages, settling tank areas, and wooden wastewater line areas also exhibited elevated lead concentrations. The highest detected lead concentration, 19,272 µg/g was detected in the 0 to 2 foot interval at location C-57, which is in an abandoned wastewater line ditch.

Elevated lead concentrations were also detected in samples collected from the Ash Pond berm area. Two samples from location C-41 contained elevated lead levels of 2369 µg/g and 97 µg/g in the 0 to 2 foot and 17 to 20 foot intervals, respectively. The sample from the 0 to 2 foot interval indicates that some contaminated material was used to construct the Ash Pond dike. The lower sample indicates isolated contamination of the WSOW drainageway (Plate 2) underlying Ash Pond. The extent of this contamination is limited as indicated by results from adjacent boreholes.

A lead concentration of 180 µg/g was detected in the 2 to 4 foot sample at location C-39. This sampling location is at the site of a WSOW settling tank which collected wastewater from TNT Production Lines 1, 2 and 3 and allowed particles (product and waste material) to settle out. These tanks frequently overflowed (Fishel and Williams, 1944), providing a release mechanism for the acidic process wastes. The extent of contamination is limited as indicated by results from adjacent samples and boreholes.

Lead was also observed at 211 µg/g at location C-60 in the north dump area in the 0 to 2 foot interval. This area is in the WSOW burning ground area. The extent of contamination is limited.

Elevated iron levels were observed at locations C-2, C-39, C-40, C-43, and C-44. The elevated iron concentrations were generally associated with elevated lead concentrations. Concentrations ranged from 35,510 µg/g at location C-40 to 82,718 µg/g at location C-44. These concentrations are less than three times the upper limit of background concentration of 29,100 µg/g. This contamination probably originated from acidic wastewater dissolving iron WSOW process equipment. The extent and magnitude of iron contamination is limited as indicated by results from adjacent boreholes.

Metals contamination from WSOW sources is limited in extent to isolated areas around major process areas. The metals contamination is, almost without exception, associated with areas of elevated nitrate and sulfate concentrations. This supports the conclusions that the origin of the nitrate and sulfate is acidic and that acidic wastewater dissolving metal process equipment and structures is the origin of the metals contamination. The limited extent of WSOW metals contamination does not appear to provide a source for groundwater contamination.

WSUFMP METAL CONTAMINATION

The nature of the material present in the uranium ore processed at the WSUFMP increases the potential for metal contamination, including uncommon metals such as vanadium and thallium.

Elevated metal concentrations were observed at numerous locations throughout the WSUFMP biased sampling program. Slightly elevated concentrations of calcium and mercury were observed at numerous locations. A general explanation of these elevated concentrations is provided in the following paragraphs.

Concentrations that warrant individual explanations are described in detail in the following subsections.

Slightly elevated calcium concentrations are generally attributable to the use of limestone aggregate in many areas. Limestone was not specifically sampled, but limestone-soil mixtures were. Slightly elevated calcium levels are not of concern, given the high, naturally-occurring background concentrations.

Very low concentrations of mercury were observed at many locations. The background concentration of mercury is below the method detection limit of 0.1 µg/g. The slightly elevated concentrations are generally below 0.3 µg/g. Mercury was probably used in instrumentation throughout the WSCP and may have been present in the processed ore. Low concentrations can be expected, given the operational history of the site.

Samples collected from an uninvestigated area east of Building 101, the Sampling Plant, exhibited elevated sodium, arsenic, and magnesium concentrations. All concentrations are less than twice background. The analytical results are presented in Appendix D. The source of contamination is not known but may be related to processed uranium ore stored near this area. The extent of contamination is limited as indicated by results from deeper samples and samples from adjacent boreholes.

The chemical transfer areas at Building 103, 201, and 301 exhibited elevated concentrations of potassium, arsenic, magnesium, copper, and lead. Elevated potassium levels were observed at locations A-8 and A-11. Arsenic was observed at location A-8 in the 4.5 to 5 foot sample at a concentration of 32 µg/g. Location A-11 also contained 206 µg/g of lead in the 1 to 1.5 foot sample. The extent of potassium, arsenic, and lead contamination is limited as indicated by results from adjacent samples and boreholes. The source or sources of these metals in this area is not known at this time.

Elevated magnesium concentrations were detected in surface samples at locations A-11 and A-13 in concentrations of 8,930 µg/g and 29,792 µg/g, respectively. This contamination appears to be related to the use of magnesium in Building 301. Copper was also detected at a concentration of 99 µg/g in the surface sample at location A-13. The source of copper contamination is not known.

Location A-15, near Building 302, contained 18,380 µg/g of magnesium in the 2 to 2.5 foot interval. Magnesium contamination was expected to be present in this area since magnesium was stored and ground in this building. Contamination should be restricted to the immediate vicinity of this building and its associated loading and unloading facilities.

Two samples collected from the Coal Pile Area, A-19 and A-20, yielded elevated nickel and chromium concentrations. Location A-19, which was drilled in the drainage from the Coal Pile, contained chromium, at concentrations of 116 µg/g and 51 µg/g, in the 0 to 1 foot and 4.5 to 5 foot samples, respectively. Nickel was also present at 46 µg/g in the surface sample. Samples from location A-20 contained 44 µg/g and 123 µg/g of chromium and 69 ug/g nickel. Surface soil contained 44 µg/g chromium while the 3.5 to 5.0 foot sample contained both chromium and nickel. Chromium and nickel are generally associated with stainless steel. The source of this contamination is not known. The extent is limited as indicated by results from adjacent boreholes.

An elevated iron concentration of 35,544 µg/g was observed at location A-21 in the 4.5 to 5 foot sample. No WSUFMP source for this contamination is known. However, 6 feet of fill material is present at this location, providing a potential source of iron. The extent of contamination is probably limited, based on results from WSOW biased sampling results.

A sample from location A-22 contained an elevated mercury concentration of 12 µg/g in the 2 to 2.5 foot interval. The source of this limited contamination is not known at this time.

Elevated levels of vanadium, lithium, arsenic, chromium, nickel, and selenium were detected in samples collected from location A-28 near Building 417, the Paint Shop. Metal contamination was present in all three samples at this location with only nickel (61 µg/g) and selenium (1.4 µg/g) present in the 4.5 to 5 foot interval. This area was sampled because of the potential for contamination from paint, solvents, and related supplies. All of the metals present are used in paints. Therefore, this contamination apparently originated as wastes from the Paint Shop. The extent of this contamination is most likely limited to surface and near surface soils in the immediate vicinity of the Paint Shop.

Samples collected from locations A-30, A-32, A-33, A-35, and A-36 contained elevated arsenic, aluminum, magnesium, potassium, selenium, and vanadium concentrations. Magnesium and arsenic were the only metals detected at elevated concentrations in surface soils. The remaining metals are present in subsurface soils. This contamination is related to the miscellaneous uses of the building and/or to the radiologically contaminated debris stored in and around these buildings. The extent of contamination is probably limited to the area immediately adjacent to these structures.

The Tank Farm areas, 102A and 102B, yielded samples with elevated concentrations of arsenic, barium, chromium, magnesium, selenium, thallium and vanadium. These locations, A-39, A-40, A-41, A-43, A-44, and A-45 were situated to evaluate the Tank Farm area and the unloading facilities. The compounds present were observed at elevated concentrations throughout the upper five feet of the soil profile. These metals, with the exception of arsenic and barium, are all used in making steel alloys like those commonly be used in chemical storage tanks and are soluable in nitric and sulfuric acid. Also the inorganic anion results indicate the presence of elevated concentrations of nitrate and sulfate at locations A-45 and A-40, respectively. The fact that these locations contain the highest concentrations of metals supports the inference that storage tanks are the source. Small quantities of materials were probably unintentionally released during unloading operations. This would account for the elevated concentrations observed. The source of elevated arsenic and barium levels is not known at this time. The extent of contamination is probably limited to the immediate Tank Farm and unloading areas.

Elevated potassium levels were detected at location A-46. Concentration of 4,832 μg/g, 3,695 μg/g, and 4,660 μg/g were observed in the 0 to 0.5, 2 to 2.5, and 4.5 to 5 foot intervals, respectively. The source of this contamination is not known at this time.

Arsenic was detected at elevated concentrations ranging from 17 μg/g to 40 μg/g in samples from locations A-47, A-48, A-50, and A-51. Barium was also detected at a concentration of 1,113 μg/g at location A-50 in the 2 to 2.5 foot sample. These samples were collected to evaluate the Green Salt Tank Farm, Area 202, in which hydrofluoric acid, anhydrous ammonia, and anhydrous hydrogen fluoride were used. No source for the elevated arsenic and barium concentrations is known at this time.

Metals results from the Fire Training Pit, Area 439, indicate elevated barium (1,543 μg/g), cadmium (11 μg/g), lead (3,499 μg/g), and selenium (15 μg/g) levels. The source of this contamination is apparently related to fire training activities. This area consists of a concrete walled and floored pit and contamination is restricted to the pit itself.

A sample collected from the railroad area west of Building 101 indicated beryllium contamination, 7,127 μg/g, in the 0.0 to 0.5 foot interval. This is probably attributable to coal handling in this area. Aluminum concentrations of 28,649 μg/g and 33,463 μg/g were observed in the 2 to 3.5 and 4.5 to 5.0 foot intervals. The source of this contamination is not known. This area was used for receiving processed uranium ore and coal, and these metals are not attributable to the known processes in this area.

Elevated vanadium and chromium concentrations were observed in the 6.5 to 7 and 4 to 5.5 foot intervals, respectively, at location A-71 in Area 303. Chipped magnesium was stored in this area. The source of the contamination is not known, but the extent is limited as indicated by sample results from adjacent boreholes.

The radiologically-contaminated area east of Building 410 yielded elevated levels of potassium and vanadium in samples from the 0 to 0.5 and 2.0 to 2.5 foot intervals. This contamination may be related to the source of radiological contamination.

An elevated lead concentration (122 μg/g) was detected in the 0 to 1 foot interval at location A-78. This location was sampled to evaluate an unknown drum storage and disposal area near Ash Pond. The lead contamination may be related to this WSUFMP activity or to the WSOW activities occurring immediately to the east. The contamination is apparently limited in extent as indicated by data from adjacent boreholes.

RADON METAL CONTAMINATION

Metals contamination was also observed at numerous locations not specifically related to, or directly attributable to, the two biased sampling programs. This contamination is generally discussed in the following paragraphs. The analytical results are presented in Appendix D.

As in the WSUFMP biased sampling program, slightly elevated concentrations of calcium and mercury were detected at numerous locations. The explanations discussed previously are valid for these results also.

Elevated potassium, iron, and aluminum concentrations were also observed and are probably due to variations in the minerals in the clay.

Since aluminum, calcium, iron, mercury, and potassium may not be directly attributable to site processes, results for these metals from random boreholes are not discussed here.

Twelve locations from the northwest quadrant of the WSCP/WSRP exhibited elevated concentrations of one or more of the following metals: arsenic, cobalt, copper, nickel, selenium, and vanadium. The source of the generally low concentrations of metals in boreholes D-2, D-3, D-4, D-13, D-15, D-27, D-29, D-35, D-36, D-56 is not known. Arsenic is the most common contaminant, occuring at elevated concentrations in five boreholes. This general low-concentration contamination is most likely related to WSOW land usage.

Nine locations in the northeast quadrant of the WSCP/WSRP exhibited elevated concentrations of one or more of the following metals: arsenic, cobalt, copper, lithium, mercury, nickel, selenium, and thallium. The source of the generally low metal concentrations in boreholes D-24, D-25, D-32, D-33, D-37, D-44, D-45, D-46, and D-51 is not known. Selenium is the most common contaminant, occurring in four samples. The extent of this contamination is limited as indicated by results from adjacent boreholes.

Four locations in the southwest quadrant contain elevated concentrations of arsenic, barium, cadmium, cobalt, nickel, and sodium. These metals were elevated in samples from boreholes D-63, D-64, D-74, and D-83. The source of shallow contamination is not known, but deeper contamination may be related to seepage from the WSRP as discussed in Section 3.2.1.

3.4 PESTICIDES/PCBs

3.4.1 Pesticides

Pesticides were not manufactured at the WSCP/WSRP, but may have been used to control insects. Therefore, samples from the WSUFMP biased sampling program were analyzed for pesticides. A total of 130 samples from 44 locations was collected and analyzed for the pesticides included in the CLP list of pesticides. Pesticides were observed in the five samples collected from five locations.

Locations A-39, A-63, and A-79 contained Endosulfan I at concentrations of 5.2 µg/Kg, 35 µg/Kg, and 31 µg/Kg, respectively. The source of this contamination is not known at this time. However, the extent is extremely limited as indicated by results from adjacent samples and boreholes.

Another pesticide, beta-BHC, was detected at locations A-68 and A-78 at concentrations of 360 µg/Kg and 18 µg/Kg, respectively. The source of this contamination is not known, but the extent is limited as indicated by results from adjacent boreholes. Previous investigations documented the presence of isolated areas of Aldrin at concentrations of less than 2 µg/kg (MKF, 1988c). Aldrin was not detected during this investigation. The pesticide results confirm that pesticides were not widely used at, or disposed of on, the WSCP/WSRP. Isolated areas of low concentrations of pesticides are present but do not represent a source for surface water or groundwater contamination.

3.4.2 Polychlorinated Biphenyls

PCBs were used at the WSUFMP as dialectic fluid in oil-cooled transformers. Spillage resulting from normal transformer servicing and leakage from transformers comprise the primary release mechanism for PCB soil contamination. PCB oils were also apparently used as lubricating fluids in numerous other buildings on the site. As a result of this usage, a total of 130 samples was collected from 44 locations and analyzed for PCBs.

PCBs were observed in 14 samples collected from 14 locations. Five of these locations are near transformers which contained PCBs. Detected levels ranged from 70 µg/Kg to 3,000 µg/Kg and were present primarily in surface soils. Data on detected PCBs are presented in Table 3-5.

Lower concentrations of PCBs were observed at nine locations in the WSCP area, including the area 102A and 102B tank farm and several underground tank areas. These PCBs are present only in surface soils. Previous investigations had detected areas of very isolated low concentration ($\leq$1 µg/g)

TABLE 3-5
PCB DATA FOR PHASE II SOILS

BOREHOLE NUMBER	COORDINATES	PARAMETER	CONCENT. UG/KG	DETECTION LIMIT
A- 3	S2-050040,100700-0.0,0.5	Aroclor-1260	350	160
A-26	S2-049860,099340-0.0,1.0	Aroclor-1254	625	160
A-26	S2-049860,099340-0.0,1.0	Aroclor-1248	324	80
A-39	S2-050440,100170-0.0,0.5	Aroclor-1254	340	160
A-42	S2-050310,100520-0.0,0.5	Aroclor-1260	280	160
A-43	S2-050360,100540-0.0,0.5	Aroclor-1260	280	160
A-44	S2-050350,100480-0.0,1.0	Aroclor-1260	2100	160
A-53	S2-099940,099740-0.0,0.5	Aroclor-1260	2600	160
A-54	S2-050200,099640-0.0,1.0	Aroclor-1260	250	980
A-57	S2-050440,100340-4.5,5.0	Aroclor-1260	70	160
A-59	S2-049700,100360-0.0,0.5	Aroclor-1260	3000	160
A-60	S2-049780,100800-0.0,0.5	Aroclor-1260	260	1
A-70	S2-049870,099590-0.0,2.0	Aroclor-1254	400	160
A-77	S2-049730,100040-0.0,1.5	Aroclor-1254	156	810
A-79	S2-049890,100840-0.0,0.5	Aroclor-1254	280	160
A-79	S2-051970,100520-0.0,1.5	Aroclor-1254	470	160

PCB contamination (MKF, 1988c). The low concentrations detected indicate that there is no widespread or severe PCB contamination.

3.5 SEMI-VOLATILE ORGANIC COMPOUNDS

Semi-volatile organic compounds (SOCs) were detected in previous investigations at the WSCP/WSRP (MKF, 1988c). In that investigation, samples from the A-series and D-series boreholes were analyzed for the CLP semi-volatile compound list. The data on SOCs detected in this investigation agree closely with the earlier investigation with respect to both species and concentrations. The analytical results for detected semi-volatile organic compounds are presented in Appendix C.

A group of compounds associated with coal, petroleum products, and incomplete combustion of organic material were observed in several samples. These compounds are: naphthalenes, chrysene, pyrenes, phenanthrene, fluoranthenes, anthracenes, and dibenzofuran. These compounds were observed in numerous samples at concentrations below the CLP required detection limits (CRDL) and at several location above the CRDL. Concentrations below these detection limits are not of environmental concern and are not discussed in this report.

The semi-volatile compounds that were detected at concentrations above the CRDL are in locations A-18 and A-19 where surface samples exhibited elevated concentrations. These samples were collected in the primary drainage from the coal pile. Concentrations were also detected in samples collected from the coal pile. The coal pile and residual coal are a source for these compounds. The extent is probably limited to the immediate vicinity of the coal pile and drainageway.

Location A-76 also yielded elevated concentrations of these compounds in surface soil. This location contains a small concrete pad of unknown usage. The source of this contamination is not known.

The other SOCs detected are phthalates, which were also observed in numerous samples during IRA characterization efforts (MKF, 1988c). Phthalates were detected at low concentrations (below CRDL) at numerous locations across the site. Concentrations above CRDL were observed at 46 locations, primarily in near surface soils. Phthalates were not used in any WSOW or WSUFMP process, so a definitive source is not known. Phthalates were, however, commonly used as propellants for insecticides. Treatment for pest control could have provided a source for the contamination observed in this investigation. However, the presence of phthalates in numerous laboratory blanks indicates that the elevated levels are laboratory contaminants and are probably not present in WSCP/WSRP soils.

3.6 VOLATILE ORGANIC COMPOUNDS

WSOW and WSUFMP processes included the use of volatile organic compounds including toluene, hexane, and ethyl ether. The containerized chemical inventory also identified numerous other chemicals, including chlorinated solvents, in numerous buildings. The A-series boreholes were used to evaluate these potential sources of volatile organic compounds. The uppermost samples from the D-series boreholes were also analyzed for volatile organic compounds to detect unexpected contamination.

No volatile organic compounds indicating soil contamination were detected in WSCP/WSRP soils. Low concentrations of acetone, methylene chloride, and toluene were observed in some samples. Acetone and methylene chloride are common laboratory contaminants and were also observed in blank samples. Acetone and toluene were also used to decontaminate sampling equipment. Low concentrations in samples indicate contamination from decontamination practices.

The absence of volatile organic compounds supports the conclusion that uncontrolled waste disposal did not occur and that the chemicals stored in WSCP buildings have not been spilled or dumped into site soils. These results were expected because of the controlled nature of the site.

3.7 MISCELLANEOUS

Miscellaneous analytical parameters for all samples included percent moisture and pH. Other analytical parameters for certain samples included Total Organic Halogens (TOX) and 2,3,7,8-TCDD. Percent moisture and pH are discussed in the following subsections.

TOX was detected in only one of the 196 samples from 107 locations. The source of this single value of 14.46 µg/g from the 8 to 15 foot interval at location D-69 cannot be explained at this time. Two samples from the fire training pit were analyzed for 2,3,7,8-TCDD, which was not detected.

3.7.1 Percent Moisture

All soil samples were analyzed for percent moisture which ranged from 1.1% to 37.7% with an average of 16.9%. Surface soils generally had a lower moisture content than subsurface soils.

3.7.2 pH

All soil samples were analyzed for pH which ranged from 4.1 to 9.8 and averaged 7.63. No corrosive soils are present at the WSCP/WSRP. This range of pH was expected and is probably due to acid and alkaline materials used at the WSOW and the WSUFMP. Limestone usage in acid handling areas would have neutralized small spills. That, coupled with the natural buffering capacity of the clay soils, explains the generally neutral nature of the soil.

4 QUALITY ASSURANCE

Soil sample quality was maintained by using procedures established in the Quality Assurance Project Plan (QAPP) (MKF, 1988e) and the soil sampling plan (MKF, 1988a). The data collected and presented in this report will be validated according to the procedures in the QAPP. Sample chain-of-custody was maintained throughout sample collection and shipment according to procedures approved by the Weldon Spring Remedial Action Project (WSSRAP).

The actual accuracy and precision of the samples was assessed through the use of duplicate, field blank, replicate, matrix spike (MS), and matrix spike duplicate (MSD) samples. The purpose of each Quality Assurance (QA) sample type and the results of their analyses are discussed in the following sections.

4.1 DUPLICATE SAMPLES

Duplicate samples are samples collected from the same locations and in the same manner as regular samples. The duplicates were used to assess the representativeness of samples and to assess laboratory performance. Duplicate samples were collected at the rate of one duplicate for each 20 regular samples. Duplicate samples were evaluated by calculating the relative percent of difference (RPD) between each original sample and its duplicate. These comparisons are summarized in Table 4-1 which presents the maximum, minimum, and average RPDs for each parameter.

The average RPD for all metals was 24.8% which is only slightly higher than the 20% error margin used in designing the unbiased portion of the sampling program. The maximum RPDs indicate either poor laboratory performance and/or extreme

TABLE 4-1

QUALITY ASSURANCE SUMMARY - DUPLICATE ANALYSIS

RELATIVE PERCENT DIFFERENCE BY COMPOUND

PARAMETER	MAXIMUM	MINIMUM	AVERAGE
Al	99.6%	1.0%	24.1%
Sb	NC	NC	NC
As	92.3%	0.8%	31.1%
Ba	99.3%	0.2%	23.1%
Be	100.0%	0.0%	19.0%
Ca	77.8%	0.3%	21.6%
Cr	99.0%	0.9%	21.7%
Co	99.3%	0.6%	37.9%
Cu	58.5%	0.2%	19.4%
Fe	99.8%	0.2%	23.5%
Pb	69.1%	0.6%	23.0%
Li	99.5%	5.4%	29.9%
Mg	99.7%	0.2%	28.2%
Mn	97.0%	0.1%	45.4%
Mo	57.0%	0.8%	18.7%
Ni	71.7%	1.3%	26.1%
K	70.1%	1.1%	26.3%
Na	46.5%	0.7%	14.6%
Va	98.9%	1.1%	20.4%
Zn	55.9%	2.1%	17.7%
Average Relative Percent Difference for Metal			23.6%
Nitrate	82.9%	0.0%	21.6%
Sulfate	99.2%	0.1%	21.7%
Fluoride	73.4%	0.1%	19.9%
Percent Moistur	83.8%	0.0%	8.6%
pH	18.8%	0.0%	4.7%

NC - NOT CALCULATED

sample variability. Replicate sample analysis was used to assess interlab variability, hence laboratory performance.

4.2 REPLICATE SAMPLES

Replicate samples are samples collected in the same manner as duplicate samples and analyzed by a different laboratory. Replicate samples were analyzed by JTC Environmental Consultants (JTC) of Rockville, Maryland. The replicate samples were collected at a one in twenty frequency and were used to assess laboratory performance.

Interlab RPDs were calculated by averaging the original and duplicate sample results (from metaTRACE) and comparing this average to the replicate sample results from JTC. Using the 25% RPD due to sample variability or laboratory error in the original and duplicate samples as discussed in Section 4.1, the average RPD between replicated and regular samples is 24%. Table 4-2 provides the average RPD by parameter.

The general agreement between duplicate and replicate RPDs supports the theory that sample variability averages approximately 25%. This is generally consistent with the assumptions used in designing the statistical portion of the overall sampling program.

4.3 BLANK SAMPLES

Blank samples were collected to assess potential contamination during shipping and storage and laboratory contamination.

Table 4-2

Quality Assurance Summary -

Replicate Analysis

Relative Percent Difference by

Compound Average

Al	6.9%
Sb	NC
As	13.1%
Ba	5.9%
Be	31.0%
Ca	10.4%
Cr	31.3%
Co	23.1%
Cu	17.6%
Fe	1.5%
Pb	23.0%
Li	NC
Mg	7.8%
Mn	5.4%
Mo	NC
Ni	13.9%
K	16.7%
Na	81.4%
Va	2.6%
Zn	6.3%
Nitrate	44.4%
Sulfate	45.3%
Fluoride	74.1%
Percent Moisture	
pH	7.3%

NC - Not calculated due to insufficient data

4.3.1 Field Blanks

One field blank sample per day was collected to assess shipping and storage effects on samples collected on a given day. Field blanks indicated that there was no contamination of samples during shipping and storage.

4.3.2 Laboratory Blanks

Blank samples were analyzed at the laboratory to assess contamination originating from laboratory procedures. Volatile organic (VOA) and semi-volatile organic compounds (SOC) contamination at the laboratory was detected using this quality control measure. Numerous VOA blanks were contaminated with low concentrations of acetone and methylene chloride. These common laboratory contaminants were also observed at low concentrations in several regular samples. The presence of these contaminants in the laboratory blanks supports the interpretation that low concentrations of acetone and methylene chloride in regular samples do not indicate actual soil contamination.

Semi-volatile organic compound blanks indicated contamination in the base/neutral fraction. Di-n-butylphthalate and Bis(2-ethylhexyl)phthalate were observed at varying concentrations in the laboratory blanks. This contamination indicates that phthalates may not be a significant soil contaminant.

4.4 MATRIX SPIKE AND MATRIX SPIKE DUPLICATE SAMPLES

MS and MSD samples were collected at a one in twenty frequency to allow the laboratory to assess the effects of the soil matrix on the analytical methods used. These samples were spiked at the laboratory and analyzed. This allowed a determination of interfering properties of the sample matrix on the actual analytical results.

4.4.1 Volatile MS/MSD Results

Nine MS and MSD samples were analyzed for volatile organic compounds. Five compounds were spiked to WSSRAP soils and recoveries were calculated. Only two spike recoveries out of 90 and six of 45 RPDs were outside Contract Laboratory Program (CLP) QC limits. This indicates good performance on volatile organic analysis with little interference from the soil matrix.

4.4.2 Semi-Volatile Organic Compound MS/MSD Results

Twelve MS and MSD samples for semi-volatile organic compound analysis were collected. These samples were spiked with 11 semi-volatile organic compounds and analyzed. Only 22 of 264 spike recoveries and nine of 132 RPDs were outside of CLP QC limits. This indicates good performance on semi-volatile organic compound analysis with limited interference from the soil matrix.

4.5 HOLDING TIMES

The U.S. Environmental Protection Agency (EPA) has not established regulatory holding times for soil samples. However, guidance on soil sample holding times is presented in SW-846 (EPA, 1986). All samples collected which were not radiologically contaminated were analyzed in accordance with the SW-846 guidelines. Twelve samples with elevated radiological contamination were held for radiological screening, and the recommended holding times for volatile and semi-volatile analyses were slightly exceeded. This slight overage should not signficantly affect data quality, since the samples were chilled.

4.6 QUALITY ASSURANCE SUMMARY

The Quality Assurance data for samples collected in the chemical soil characterization program indicate that the data meet the Precision, Accuracy, Representativeness, Reproducibility and Completeness (PARRC) conditions of the QAPP. The existing data set is of sufficient quality and quantity to support the Remedial Investigation/Feasibility Study - Environmental Impact Statement (RI/FS-EIS) without qualification. The data presented in this report accurately represent on-site conditions at the time of sample collection.

The assumptions used to statistically determine the number of random samples were validated by the actual analytical results. Therefore, the statistical objectives of the sampling plan were obtained.

5 CONCLUSIONS

This report presents the chemical soil characterization data for the Weldon Spring Chemical Plant and Raffinate Pits (WSCP/WSRP). Numerous minor conclusions have been drawn in the interpretation of the data. These minor conclusions lead to the following major conclusions:

1. All chemical soil data indicate that there are no large source areas of nitroaromatic compounds on the site. The nitroaromatic compounds observed in groundwater during the Phase I Water Quality Assessment and subsequent monitoring appear to be related to wastewater releases and contamination from the Weldon Spring Ordnance Works (WSOW). It appears that no significant soil source for this contamination now exists on the site.

2. In general, the horizontal and vertical extent of nitrate and sulfate contamination is generally limited and does not represent a source for groundwater contamination. Exceptions are sulfate contamination in soils near TNT Production Line No. 1 and nitrate soil contamination adjacent to, and underlying, the Raffinate Pits.

3. No volatile organic soil contamination is present in WSCP/WSRP soils. Low-level semi-volatile organic contamination is present in isolated areas related to coal storage and burning areas. No effects on groundwater or surface water were observed in previous investigations, and none are expected in future monitoring.

4. No significant polychlorinated biphenyl (PCB) or pesticide contamination was observed. Minor amounts of PCB contamination are present adjacent to the transformer pads.

5. Isolated areas of metal contamination exist throughout the WSCP/WSRP. These areas are related to both WSOW and Weldon Spring Uranium Feed Material Plant (WSUFMP) processes and do not represent potential sources for groundwater contamination.

6. Soil underlying buildings, roads, and paved areas will not require additional characterization as indicated by the general lack of significant chemical soil contamination.

7. The statistical objectives of the sampling plan were met.

6 REFERENCES

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APPENDIX A
SAMPLING PROGRAM

Weldon Spring Feed Materials Plant Biased Sampling Locations - A Series Boreholes

POINT A-#	COORDINATES WEST	COORDINATES NORTH	COORDINATES DESCRIPTION	NUMBER OF SAMPLES	DEPTH OF SAMPLE	SAMPLE TYPE COMP./GRAB	TYPE OF SOIL CHEMICAL ANALYSIS*	RATIONALE
Building 101 Area								
1)	50,100	100,730	Uninvestigated area east of 101	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,M,N	Unknown area
2)	50,100	100,650	Uninvestigated area east of 101	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,M,N	Unknown area
3)	50,040	100,700	Uninvestigated area east of 101	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,M,N	Unknown area
4)	50,240	101,030	Drum storage, north of 109 & 110	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,G,H,L,N	Unknown contents; nitric acid, organics
5)	50,130	100,960	Drum storage, north of 109 & 110	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,G,H,L,N	Unknown contents
6)	50,120	101,600	Drum storage, north of 109 & 110	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,G,H,L,N	Unknown contents
Building 103 Area								
7)	50,220	100,325	Process Lines at 103	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,O	Process lines into-out of building
8)	50,125	100,080	Process lines at 103	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,O	Process lines into-out of building
Building 105 Area								
9)	50,240	100,475	Process Lines at 105	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	F,G,H,L	Process lines into-out of building
10)	50,150	100,425	Process Lines at 105	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	F,G,H,L	Process lines into-out of building
Building 201 Area								
11)	50,225	99,850	Chemical transfer at 201 area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,O	Chemical transfer point
Building 301 Area								
12)	50,375	99,650	Chemical transfer at 301 area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,O	Chemical transfer point
13)	50,075	99,400	Chemical transfer at 301 area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,O	Chemical transfer point
14)	50,225	99,400	Chemical transfer at 301 area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,O	Chemical transfer point

* See key code for analytical description, page 112.

POINT A-#	COORDINATES WEST	NORTH	COORDINATES DESCRIPTION	NUMBER OF SAMPLES	DEPTH OF SAMPLE	SAMPLE TYPE COMP./GRAB	TYPE OF SOIL CHEMICAL ANALYSIS	RATIONALE
Building 302 Area								
15)	50,390	99,175	Grassy area north of building 302	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,L	Lead & Magnesium chips released in this area
Building 401 Area								
16)	50,575	100,725	Incineration 401	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L	Stock/incinerator area
Building 401 Area								
17)	50,550	100,950	Coal storage area north of 401	3	0-6", 2-2.5", 4.5-5'	Composite at each interval	D,G,H,N	Uninvestigated area
18)	50,550	101,070	Coal storage area north of 401	3	0-6", 2-2.5", 4.5-5'	Composite at each interval	D,G,H,N	Uninvestigated area
19)	50,550	101,210	Coal storage area north of 401	3	0-6", 2-2.5", 4.5-5'	Composite at each interval	D,G,H,N	Uninvestigated area
20)	50,660	100,940	Coal storage area north of 401	3	0-6", 2-2.5", 4.5-5'	Composite at each interval	D,G,H,N	Uninvestigated area
Building 403 Area								
21)	94,800	100,675	Process line 403	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L	Process line
Building 404 Area								
22)	49,725	100,675	Process line 404	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L	Process line
Building 408 Area								
23)	49,700	99,550	One drum east of 408	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	F,H,L,M	Unknown contents of drums; cyanide, PCBs
24)	49,910	99,830	Drum storage west of 408	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	F,G,H,L,M	Unknown contents; sodium cyanide, PCBs
25)	49,775	99,975	Degreasing station 408	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M	Use of solvents, degreasers, cleaning agents
Building 417 Ar a								
26)	49,860	39,340	Drum storage area south of 417	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M	Unknown contents of drums; benzene, MBK, phenolene, solvents
27)	49,870	99,440	Drum storage area south of 417	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	F,G,H,L	Unknown contents of drums

POINT A-#	COORDINATES WEST	NORTH	COORDINATES DESCRIPTION	NUMBER OF SAMPLES	DEPTH OF SAMPLE	SAMPLE TYPE COMP./GRAB	TYPE OF SOIL CHEMICAL ANALYSIS	RATIONALE
Building 417 Area (continued)								
28)	49,830	99,470	Drum storage area south of 417	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L	Unknown contents of drums
Buildings 433, 434, 435, 436, 437, & 438								
29)	50,740	98,250	Drum storage area west of 436	2	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L	Unknown contents of drum
30)	50,710	98,350	Drum storage area, west and adjacent to 436	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L	Unknown contents of drums
31)	50,830	98,410	Drum storage area, west of 436	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	F,G,H,L	Unknown contents of drums
32)	50,680	98,410	Drum storage area, east and adjacent to 436	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,G,H,F,L	Unknown contents of drums
33)	50,610	98,370	Drum storage area west of 435	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M	Unknown contents of drums
34)	50,570	98,330	Drum storage area west of 436	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M	Unknown contents of drums
35)	50,560	98,440	Drum storage area east side of 435	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M	Unknown contents of drums; PCBs, sulfuric, nitric, sodium fluoride
36)	50,670	98,610	Concrete pad east of 437	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,N	Unknown concrete pad; PCBs, sulfuric, nitric, sodium fluoride
Area 102 A and B								
37)	50,500	100,140	Area 102B tank farm area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M	Unknown contents of tanks; hexane, sulfuric, ethyl ether, sodium hydroxide
38)	50,500	,00,240	Area 102B tank farm area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,O	Unknown contents of tanks, hexane, sulfuric, ethyl ether, sodium hydroxide
39)	50,440	00,170	Area 102B tank farm area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,O	Unknown contents of tanks, hexane, sulfuric, ethyl ether, sodium hydroxide

POINT A-#	COORDINATES WEST	NORTH	COORDINATES DESCRIPTION	NUMBER OF SAMPLES	DEPTH OF SAMPLE	SAMPLE TYPE COMP./GRAB	TYPE OF SOIL CHEMICAL ANALYSIS	RATIONALE
Area 102 A and B (continued)								
40)	50,440	100,380	Area 102B tank farm area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,O	Unknown contents of tanks, hexane, sulfuric, ethyl ether, sodium hydroxide
41)	50,440	100,450	Area 102B tank farm area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,O	Unknown contents of tanks; hexane, sulfuric, ethyl ether, sodium hydroxide
42)	50,310	100,520	Area 102A tank farm area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,O	Unknown contents of tanks; hexane, sulfuric, ethyl ether, sodium hydroxide
43)	50,360	100,540	Area 102A tank farm area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,O	Unknown contents of tanks; hexane, sulfuric, ethyl ether, sodium hydroxide
44)	50,350	100,480	Area 102A tank farm area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,O	Unknown contents of tanks; hexane, sulfuric, ethyl ether, sodium hydroxide
45)	50,340	100,420	Area 102A tank farm area	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,O	Unknown contents of tanks; hexane, sulfuric, ethyl ether, sodium hydroxide
Area 108								
46)	50,350	100,350	108, west side near railroad tracks	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,L,N,O	Nitric acid area, nitric & ferric acids
Area 202								
47)	50,370	99,830	South end of 202 adjacent to HF tanks	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,L,N,O	Possible metals & acid; hydrofluoric acid, anhydrous ammonia, hydrogen fluoride
48)	50,370	99,850	South end of 202 adjacent to HF tanks	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,L,N,O	Possible metals & acid
49)	50,370	99,110	South end of 202 adjacent to HF tanks	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,L,N,O	Possible metals & acid
50)	50,300	99,950	South end of 202 adjacent to HF tanks	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,L,N,O	Possible metals & acid
51)	50,350	99,980	South end of 202 adjacent to HF tanks	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,L,N,O	Possible metals & acid

POINT A-#	COORDINATES WEST	NORTH	COORDINATES DESCRIPTION	NUMBER OF SAMPLES	DEPTH OF SAMPLE	SAMPLE TYPE COMP./GRAB	TYPE OF SOIL CHEMICAL ANALYSIS	RATIONALE
Transformers								
52)	50,790	98,300	Transformer substation, west of 436	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	M	Possible PCBs
53)	99,940	99,740	Substation west of 408	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	M	Possible PCBs
54)	50,200	99,640	Substation north of 301	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	L,M	Possible PCBs; caustics, magnesium, asbestos
55)	50,250	99,920	Substation west of 201	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	L,M	Possible PCBs; hydrofluoric acid, lime, Freon, asbestos
56)	50,680	99,990	Substation west of 201	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	M	Possible PCBs
57)	50,440	100,340	Substation west of 108	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	M	Possible PCBs, nitric & ferric acids
58)	50,480	100,640	Substation south of 401	3	0-6", 2-3.5', 4.5-5'	Composite at each interval	L,M	Possible PCBs; barium chloride, chlorine, hydrofluoric, phosphate, sulfate,
59)	49,700	100,360	Substation north of 410	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	M	Possible PCBs
60)	49,780	100,800	Substation north of 405B	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	M	Possible PCBs
Building 413 Area								
61)	50,525	100,525	Chemical transfer area 413	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	L	Chemical transfer point
Area 427								
62)	50,180	98,830	Waste treatment facility Area 427	1	Sludge & sediment from bottom of pond	Grab from bottom of pond	D,G,H,L,M,N	Unknown contents pond
Areas 439 & 443								
63)	50,910	100,860	Fire training pit west of 439	1	Sludge & sediment from bottom of pit	Grab	A,D,F,G,H,M,N	Unknown contents

POINT A-#	COORDINATES WEST	COORDINATES NORTH	COORDINATES DESCRIPTION	NUMBER OF SAMPLES	DEPTH OF SAMPLE	SAMPLE TYPE COMP./GRAB	TYPE OF SOIL CHEMICAL ANALYSIS	RATIONALE
Areas 439 & 443 (continued)								
64)	50,810	00,770	Filter south of 439	1	Sludge & sediment from bottom of filter	Grab	D,G,H,L,M,N	Unknown contents
Railroad Area								
65)	50,360	100,660	Tank area east of 101 on railroad tracks	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M	Unknown contents
Tanks - Underground								
66)	50,390	100,820	Underground fuel tank, NE of 401	3	2' intervals to 10'	Composite at each interval	F,M	Unknown contents
Tanks - Underground								
67)	50,750	100,770	Underground tank south of 439	5	2' intervals to 10'	Composite at each interval	D,G,H,M,N	Unknown contents
68)	49,740	100,970	Underground treatment tank near 101	3	2' intervals to 10'	Composite at each interval	D,F,M,N	
69)	50,590	98,210	Fuel storage tank south of 436	5	Composite Samples at 2' intervals 40 10' (0-2, 2-4, 4-6, 6-8, 8-10)	Composite at each interval	F	Underground fuel tanks; PCBs, sulfuric acid, nitric acid, sodium fluoride
70)	49,870	99,590	Underground storage tank south of 408	5	Samples at 2' intervals to 10' (0-2, 2-4, 4-6, 6-8, 8-10)	Composite at each interval	F,M	Unknown contents
Miscellaneous								
71)	50,510	99,530	Area south of 303	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,M	Unknown area
72)	50,460	99,600	Area 313 "chips storage" around foundation	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L	Unknown storage area
73)	50,520	99,770	Scrap storage yard south of 419	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M	Unknown storage area
74)	50,980	100,420	Stainless steel tank, TBP outside fence west of 428	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,M	Unknown contents; propane

POINT A-#	COORDINATES WEST	COORDINATES NORTH	COORDINATES DESCRIPTION	NUMBER OF SAMPLES	DEPTH OF SAMPLE	SAMPLE TYPE COMP./GRAB	TYPE OF SOIL CHEMICAL ANALYSIS	RATIONALE
75)	49,880	:00,240	Radiologically contaminated area west of 410	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,G,H,M,N	Unknown area
76)	49,800	100,620	Concrete pad	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,F,G,H,L,M,N,K	Unknown area
77)	49,730	100,040	Filter, north of 404	1	Sludge & sediment from bottom of filter	Grab	D,G,H,M,N	Unknown contents; barium fluoride, lithium chloride, lithium fluoride
78)	51,970	.00,520	Landfill (drum disposal area)	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	A,D,F,G,H,L,M,N,O	Unknown disposal area
79)	49,890	100,840	Tank north of 403	3	0-6", 2-2.5', 4.5-5'	Composite at each interval	D,G,H,M	Unknown contents

WSOW Biased Soil Sampling Locations - C Series Boreholes

Borehole Number	Coordinates West	Coordinates North	Borehole Depth	Number of Samples	Chemical Analysis
Wash House Area of TNT Production Line No. 1					
1	49,370	100,740	12	6	A, L, O, P
2	49,425	100,725	14	7	" "
3	49,410	100,758	14	7	" "
4	49,468	100,712	14	7	" "
5	49,475	100,770	14	7	" "
75	49,450	100,870	14	7	" "
Drainage From TNT Production Line No. 1					
6	49,450	100,450	16	8	A, L, O, P
7	49,583	100,650	20	10	" "
8	49,635	100,850	21	11	" "
9	49,625	101,000	12	6	" "
Final Production Area of TNT Line No. 1					
10	50,040	101,285	6	3	A, L, O, P
11	50,055	101,215	6	3	" "
12	50,100	101,240	6	3	" "
13	50,140	101,255	8	4	" "
TNT Production Line No. 2 Acid Recovery Building Drainage					
14	50,550	101,050	14	7	A, L, O, P
15	50,550	101,000	20	10	" "
16	50,550	100,950	22	11	" "
17	50,500	100,950	22	11	" "
18	50,600	100,950	22	11	" "
TNT Production Line No. 2 T-11 Building Area					
19	50,765	100,685	10	5	A, L, O, P
20	50,785	100,685	10	5	" "
Wash House Area of TNT Production Line No. 2					
21	50,760	100,150	12	6	A, L, O, P
22	50,785	100,120	12	6	" "
23	50,800	100,150	12	6	" "
24	50,900	99,985	10	5	" "
25	50,850	100,100	10	5	" "
26	50,850	100,185	12	6	" "
27	50,900	100,250	10	5	" "

WSOW Biased Soil Sampling Locations - C Series Boreholes

Borehole Number	Coordinates West	North	Borehole Depth	Number of Samples	Chemical Analysis
TNT Production Line No. 3 T-11 Building Area					
28	51,285	99,990	8	4	A, L, O, P
29	51,400	100,400	10	5	" "
30	51,400	100,450	10	5	" "
Final Production Area of TNT Line No. 2					
31	51,185	100,845	10	5	A, L, O, P
32	51,220	100,860	10	5	" "
33	51,250	100,890	10	5	" "
34	51,280	100,890	10	5	" "
35	51,320	100,875	10	5	" "
36	51,365	100,880	10	5	" "
37	51,400	100,850	10	5	" "
38	51,430	100,900	8	4	" "
Final Settling Tank of TNT Production Line No. 3					
39	52,220	100,750	14	7	A, L, O, P
40	52,200	100,725	14	7	" "
Drainage From TNT Lines 2 and 3					
41	52,116	100,760	20	10	A, L, O, P
42	52,123	100,732	20	10	" "
43	52,135	100,710	20	10	" "
Wash House Area of TNT Production Line No. 3					
44	51,815	100,360	8	4	A, L, O, P
45	51,780	100,315	8	4	" "
46	51,840	100,280	8	4	" "
47	51,800	100,265	8	4	" "
48	51,760	100,243	8	4	" "
TNT Production Line No.4 T-9 Building Area					
49	51,225	98,775	10	5	A, L, O, P
50	51,200	98,800	8	4	" "
51	51,225	98,825	8	4	" "
TNT Production Line No.4 T-10 Building Area					
52	51,642	98,925	8	4	A, L, O, P
53	51,334	98,945	10	5	" "
54	51,322	98,950	8	4	" "
TNT Production Line No.1 T-24 Building Area					
55	51,200	101,500	8	4	A, L, O, P
56	51,200	101,450	8	4	" "

WSOW Biased Soil Sampling Locations - C Series Boreholes

Borehole Number	Coordinates West	North	Borehole Depth	Number of Samples	Chemical Analysis
Wastewater Line Excavation					
57	51,565	100,850	10	5	*
Burning Grounds Area					
58	52,300	101,400	10	5	A, K, L, O, P *
59	52,350	101,400	10	5	" " *
60	52,400	101,400	10	5	" " *
61	52,250	101,400	10	5	" " *
WSOW Rubble Area					
62	52,900	100,400	10	5	A, K, L, O, P *
63	52,775	100,475	10	5	" " *
Cinder Pile					
64	51,400	100,690	0 to 18"	1	A, K, L, O, P
WSOW Dump Area					
65	51,300	100,850	0 to 12"	1	" "
66	51,275	100,845	0 to 12"	1	" "
67	51,250	100,855	0 to 12"	1	" "
68	51,320	100,850	0 to 12"	1	" "
WSOW Foundation					
69	51,550	100,850	0 to 12"	1	" "
WSOW Foundation					
70	51,700	100,850	0 to 12"	1	" "
WSOW Rubble Pile					
71	51,745	100,925	0 to 12"	1	" "
72	51,770	100,920	0 to 12"	1	" "
WSOW Rubble and Foundation					
73	52,400	100,700	0 to 12"	1	" "
74	52,350	100,700	0 to 12"	1	" "

Random Sampling Locations

Sample Number D-	Sample West	Coordinates North	Cut or Fill Depth	Borehole Depth	Number of Samples	Composite Intervals	Soil Chemical Analysis
1	51,500	101,800	0'	15'	2	(0-1, 2-3, 4-5, 6-7) (8-9, 10-11, 12-13, 14-15)	A, B1
2	51,000	101,800	0'	15'	2	" "	A, B1
3	51,750	101,600	0'	15'	2	" "	A, B1
4	51,250	101,600	0'	15'	2	" "	A, B1
5	50,700	101,600	0'	15'	2	" "	A, B1
6	50,200	101,600	2'C	15'	2	" "	A, B1
7	52,300	101,320	6'C	15'	2	" "	A, B1
8	51,750	101,330	0'	15'	2	" "	A, B1
9	51,250	101,300	0'	15'	2	" "	A, B1
10	50,700	101,300	0'	15'	2	" "	A, B1
11	50,250	101,300	2'	15'	2	" "	A, B1
12	49,690	101,250	8'C	15'	2	" "	A, B1
13	52,500	101,150	2'F	17'	3	(0-1, 2-3, 4-5, 6-7) (8-9, 10-11, 12-13, 14-15) (16-17)	A, B2, C1
14	52,000	101,150	2'F	17'	3	" " "	A, B2, C1
15	51,500	101,150	2'F	17'	3	" " "	A, B2, C1
16	51,000	101,150	0'	15'	2	(0-1, 2-3, 4-5, 6-7) (8-9, 10-11, 12-13, 14-15)	A, B1
17	50,500	101,150	10'F	25'	4	(0-1, 2-3, 4-5, 6-7) (8-9, 10-11, 12-13, 14-15) +(16-17, 18-19, 20-21, 22-23) (24-25)	A, B2, C2, D1
18	50,000	101,150	4'C	15'	2	" "	A, B1

* Location moved off grid to accessible location

A = 0-1, 2-3, 4-5, 6-7 ANALYZED FOR A, D, F, G, H, L, N, O.

B = 8-9, 10-11, 12-13, 14-15 (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

C = 16-17, 18-19, 20-21, 22-23 DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

D = 24-25, 26-27, 28-29, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

E = 30-31, 32-33, 34-35, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

Random Sampling Locations

Sample Number D-	Sample West	Coordinates North	Cut or Fill Depth	Borehole Depth	Number of Samples	Composite	Intervals	Soil Chemical Analysis
19	49,500	101,150	2'C	15'	2	"	"	A, B1
20	52,500	101,900	6'F	21'	3	"	"	A, B2, C1
21	52,000	100,900	4'F	19'	3	"	"	A, B2, C1
22	51,500	100,900	0'	15'	2	"	"	A, B1
23	51,000	100,900	0'	15'	2	"	"	A, B1
24	50,500	100,900	14'F	29'	4	+(26-27, 28-29)		A, B2, C2, D1
25	50,000	100,900	0'	15'	2	"	"	A, B1
26	49,500	100,900	4'F	19'	3	"	"	A, B2, C1
27	52,250	100,725	6'F	21'	3	"	"	A, B2, C1
28	51,780	100,750	2'F	17'	3	"	"	A, B2, C1
29	51,280	100,750	2'F	17'	3	"	"	A, B2, C1
30	50,750	100,700	2'C	15'	2	"	"	A, B1
31	50,280	100,750	2'F	17'	3	"	"	A, B2, C1
32	49,780	100,730	6'F	21'	3	"	"	A, B2, C1
33	49,310	100,740	4'F	19'	3	"	"	A, B2, C1
34	52,240	100,440	2'F	17'	3	"	"	A, B2, C1
35	51,770	100,430	2'F	17'	3	"	"	A, B2, C1
36	51,230	100,420	0'	15'	2	"	"	A, B1

* Location moved off grid to accessible location

A = 0-1, 2-3, 4-5, 6-7 ANALYZED FOR A, D, F, G, H, L, N, O.

B = 8-9, 10-11, 12-13, 14-15 (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

C = 16-17, 18-19, 20-21, 22-23 DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

D = 24-25, 26-27, 28-29, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

E = 30-31, 32-33, 34-35, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

Random Sampling Locations

Sample Number D-	Sample West	Coordinates North	Cut or Fill Depth	Borehole Depth	Number of Samples	Composite	Intervals	Soil Chemical Analysis
37	51,730	100,420	2'C	15'	2	"	"	A, B1
38	50,220	100,420	2'C	15'	2	"	"	A, B1
39	49,740	100,420	8'F	23'	3	"	"	A, B2, C1
40	49,270	100,420	4'C	15'	2	"	"	A, B1
41	52,010	100,320	2'F	17'	3	"	"	A, B2, C1
42	51,500	100,340	2'C	15'	2	"	"	A, B1
43	50,970	100,330	2'C	15'	2	"	"	A, B1
44	50,500	100,330	4'C	15'	2	"	"	A, B1
45	50,000	100,330	2'F	17'	3	"	"	A, B2, C1
46	49,520	100,330	4'F	19'	3	"	"	A, B2, C1
47	49,000	100,330	6'C	15'	2	"	"	A, B1
48	51,970	100,080	2'F	17'	3	"	"	A, B2, C1
49	51,500	100,020	2'F	17'	3	"	"	A, B2, C1
50	51,000	100,020	2'F	17'	3	"	"	A, B2, C1
51	50,500	100,020	0'	15'	2	"	"	A, B1
52	50,000	100,020	2'F	17'	3	"	"	A, B2, C1
53	49,500	100,020	0'	15'	2	"	"	A, B1
54	49,000	100,010	6'C	15'	2	"	"	A, B1

* Location moved off grid to accessible location

A = 0-1, 2-3, 4-5, 6-7 ANALYZED FOR A, D, F, G, H, L, N, O.

B = 8-9, 10-11, 12-13, 14-15 (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

C = 16-17, 18-19, 20-21, 22-23 DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

D = 24-25, 26-27, 28-29, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

E = 30-31, 32-33, 34-35, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

Random Sampling Locations

Sample Number D-	Sample West	Coordinates North	Cut or Fill Depth	Borehole Depth	Number of Samples	Composite Intervals		Soil Chemical Analysis
55	42,240	99,830	0'	15'	2	"	"	A, B1
*56	51,700	100,000	0'	15'	2	"	"	A, B1
*57	51,250	99,950	20'F	35'	5	+(30-31, 32-33, 34-35)		A, B2, C2, D2, E1
58	50,750	99,850	0'	15'	2	"	"	A, B1
59	50,250	99,850	4'C	15'	2	"	"	A, B1
60	49,750	99,900	4'C	15'	2	"	"	A, B1
61	49,250	99,900	4'C	15'	2	"	"	A, B1
*62	52,350	99,660	0'	15'	2	"	"	A, B1
*63	51,800	100,000	0'	15'	2	"	"	A, B1
*64	51,000	99,650	18'F	33'	5	"	"	A, B2, C2, D2, E1
65	50,710	99,650	2'F	17'	3	"	"	A, B2, C1
66	50,240	99,650	4'C	15'	2	"	"	A, B1
67	49,720	99,650	0'	15'	2	"	"	A, B1
*68	52,200	99,410	0'	15'	2	"	"	A, B1
*69	51,000	99,000	2'F	17'	3	"	"	A, B2, C1
70	51,000	99,430	2'F	17'	3	"	"	A, B2, C1

* Location moved off grid to accessible location
A = 0-1, 2-3, 4-5, 6-7 ANALYZED FOR A, D, F, G, H, L, N, O.
B = 8-9, 10-11, 12-13, 14-15 (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)
C = 16-17, 18-19, 20-21, 22-23 DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)
D = 24-25, 26-27, 28-29, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)
E = 30-31, 32-33, 34-35, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

Random Sampling Locations

Sample Number D-	Sample West	Coordinates North	Cut or Fill Depth	Borehole Depth	Number of Samples	Composite	Intervals	Soil Chemical Analysis
71	50,510	99,430	4'F	19'	3	"	"	A, B2, C1
72	50,010	99,430	0'	15'	2	"	"	A, B1
*73	52,150	99,150	0'	15'	2	"	"	A, B1
*74	51,450	98,850	2'F	17'	3	"	"	A, B2, C1
75	50,980	99,180	2'F	17'	3	"	"	A, B2, C1
76	50,480	99,180	2'F	17'	3	"	"	A, B2, C1
77	50,000	99,200	2'C	15'	2	"	"	A, B1
*78	52,180	99,000	2'F	17'	3	"	"	A, B2, C1
79	51,350	99,000	2'F	17'	3	"	"	A, B2, C1
*80	50,550	99,000	2'F	17'	3	"	"	A, B2, C1
81	50,250	99,000	0'	15'	2	"	"	A, B1
82	51,720	98,780	2'F	17'	3	"	"	A, B2, C1
83	51,300	98,790	2'F	17'	3	"	"	A, B2, C1
*84	50,550	98,790	2'F	17'	3	"	"	A, B2, C1
85	50,250	98,750	0'	15'	2	"	"	A, B1
86	51,500	98,550	0'	15'	2	"	"	A, B1
87	51,040	98,550	0'	15'	2	"	"	A, B1
88	50,500	98,550	0'	15'	2	"	"	A, B1

* Location moved off grid to accessible location
A = 0-1, 2-3, 4-5, 6-7 ANALYZED FOR A, D, F, G, H, L, N, O.
B = 8-9, 10-11, 12-13, 14-15 (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)
C = 16-17, 18-19, 20-21, 22-23 DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)
D = 24-25, 26-27, 28-29, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)
E = 30-31, 32-33, 34-35, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

Random Sampling Locations

Sample Number D-	Sample West	Coordinates North	Cut or Fill Depth	Borehole Depth	Number of Samples	Composite	Intervals	Soil Chemical Analysis
89	50,950	98,300	0'	15'	2	"	"	A, B1
90	50,500	98,350	0'	15'	2	"	"	A, B1
91	50,800	98,150	0'	15'	2	"	"	A, B1

* Location moved off grid to accessible location
A = 0-1, 2-3, 4-5, 6-7 ANALYZED FOR A, D, F, G, H, L, N, O.
B = 8-9, 10-11, 12-13, 14-15 (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)
C = 16-17, 18-19, 20-21, 22-23 DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)
D = 24-25, 26-27, 28-29, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)
E = 30-31, 32-33, 34-35, DEPENDING ON TOTAL DEPTH (-1 IF ANALYZED FOR L, O) (-2 IF ANALYZED FOR A, D, F, G, H, L, N, O)

APPENDIX B
INORGANIC ANION DATA

INORGANIC ANION DATA - PHASE II SOILS

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
A- 4	S2-050240,101030-0.0,0.5	09/01/88	8.17	1.75	ND	58.35
A- 4	S2-050240,101030-2.0,2.5	09/01/88	7.16	1.20	ND	83.77
A- 4	S2-050240,101030-4.5,5.0	09/01/88	18.62			26.09
A- 5	S2-050130,100960-0.0,0.5	09/01/88	7.22	4.58	ND	51.57
A- 5	S2-050130,100960-2.0,2.5	09/01/88	9.3	0.99	ND	48.0
A- 5	S2-050130,100960-4.5,5.0	09/01/88	6.00	1.32	ND	22.0
A- 6	S2-050120,101600-0.0,0.5	09/01/88	5.88	1.41	ND	226.78
A- 6	S2-050120,101600-2.0,2.5	09/01/88	7.63	1.67	ND	332.57
A- 6	S2-050120,101600-4.5,5.0	09/01/88	10.51	1.12	ND	30.94
A- 8	S2-050125,100080-2.0,2.5	09/13/88	5.32	ND	ND	124.11
A- 8	S2-050125,100080-4.5,5.0	09/13/88	3.90	ND	ND	9.81
A- 9	S2-050240,100475-0.0,0.5	09/12/88	4.88	ND	ND	8.36
A- 9	S2-050240,100475-2.0,2.5	09/12/88	6.45	ND	ND	38.12
A- 9	S2-050240,100475-4.5,5.0	09/12/88	7.37	ND	ND	13.32
A-10	S2-050150,100425-4.0,5.0	09/13/88	4.30	1.25	ND	27.73
A-10	S2-050150,100425-4.0,5.0-DU	09/13/88	5.87	1.77	ND	34.57
A-11	S2-050225,099850-1.0,1.5	10/05/88	21.1	ND	ND	321
A-11	S2-050225,099850-2.0,2.5	10/05/88	11.59	1.11	ND	220.82
A-11	S2-050225,099850-4.5,5.0	10/05/88	16.37	0.84	ND	107.31
A-12	S2-050375,099650-0.0,0.5	09/14/88	2.46	10.64	ND	118.72
A-12	S2-050375,099650-2.0,2.5	09/14/88	8.61	31.27	ND	69.03
A-12	S2-050375,099650-4.5,5.0	09/14/88	9.24	1.05	ND	22.14
A-13	S2-050075,099400-0.0,1.0	08/29/88	11.64	0.87	ND	42.87
A-13	S2-050075,099400-2.0,2.5	08/29/88	9.00	ND	ND	43.92
A-13	S2-050075,099400-4.5,5.0	08/29/88	4.61	ND	ND	31.56
A-14	S2-050225,099400-2.0,2.5	08/30/88	5.74	ND	ND	41.6
A-14	S2-050225,099400-4.5,5.0	08/30/88	1.66	ND	ND	28.4
A-15	S2-050390,099175-0.0,0.5	08/29/88	12.7	ND	ND	142
A-15	S2-050390,099175-2.0,2.5	08/29/88	8.98	ND	ND	101
A-15	S2-050390,099175-4.5,5.0	08/29/88	5.32	6.59	ND	150
A-16	S2-050575,100725-0.0,0.5	09/07/88	3.21	1.38	ND	288.68
A-16	S2-050575,100725-2.0,3.5	09/07/88	8.17	1.15	ND	43.93
A-16	S2-050575,100725-2.0,3.5-DU	09/07/88	6.41	0.63	ND	75.39
A-16	S2-050575,100725-4.5,5.0	09/07/88				
A-17	S2-050500,100950-0.0,2.0	09/02/88	5.18	1.30	ND	27.80
A-17	S2-050550,100950-0.0,1.5-DU	09/07/88	ND	1.51	ND	403.56
A-21	S2-094800,100675-0.0,0.5	09/01/88	3.78	1.06	ND	54.1
A-21	S2-094800,100675-2.0,2.5	09/01/88	4.35	0.97	ND	60.4
A-21	S2-094800,100675-4.5,5.0	09/01/88	5.92	0.85	ND	42.9
A-22	S2-049725,00675-0.0,0.5	09/01/88	4.48	2.53	ND	34.2
A-22	S2-049725,00675-2.0,2.5	09/01/88	22.5	65.9	1.31	4.76
A-22	S2-049725,00675-4.5,5.0	09/01/88	7.48	0.71	ND	37.0
A-23	S2-049700,099550-0.0,2.0	08/29/88	4.30	6.05	ND	179

INORGANIC ANION DATA - PHASE II SOILS (continued)

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
A-23	S2-049700,099550-0.0,2.0-MS	08/29/88	13.2	13.5	12.2	127
A-23	S2-049700,099550-0.0,2.0-MSD	08/29/88	1.05	4.30	ND	117
A-23	S2-049700,099550-2.5,3.0	08/29/88	ND	1.08	ND	24.9
A-23	S2-049700,099550-4.5,5.0	08/29/88	ND	ND	ND	9.16
A-24	S2-049910,099830-0.0,1.0	08/30/88	2.36	ND	ND	40.5
A-24	S2-049910,099830-0.0,1.0-DU	08/30/88	4.05	ND	ND	33.5
A-24	S2-049910,099830-0.0,1.0-DU	08/30/88	2.45	ND	ND	31.0
A-24	S2-049910,099830-2.0,2.5	08/30/88	3.73	ND	ND	1.78
A-24	S2-049910,099830-2.0,4.0-MS	08/30/88	16.5	9.72	12.18	123
A-25	S2-049910,099830-3.0,5.0	08/30/88	6.00	ND	ND	6.49
A-25	S2-049910,099830-3.0,5.0-DU	08/30/88	5.94	ND	ND	5.94
A-25	S2-049775,099975-0.0,0.5	08/30/88	1.71	8.20	ND	16.9
A-25	S2-049775,099975-2.0,2.5	08/30/88	5.03	ND	ND	90.5
A-26	S2-049860,099340-0.0,1.0	08/29/88	6.80	ND	ND	36.8
A-26	S2-049860,099340-4.5,5.0	08/29/88	10.0	ND	ND	56.0
A-26	S2-049860,099340-2.0,2.5	08/29/88	8.82	ND	ND	65.0
A-27	S2-049870,099440-0.0,0.5	08/29/88	2.43	1.62	ND	15.9
A-27	S2-049870,099440-2.0,4.0	08/29/88	3.38	ND	ND	107
A-27	S2-049870,099440-2.0,4.0-MSD	08/30/88	462	ND	ND	112
A-27	S2-049870,099440-4.5,5.0	08/29/88	3.95	ND	ND	40.3
A-28	S2-049830,099470-0.0,1.0	08/29/88	12.1	ND	ND	119
A-28	S2-049830,099470-2.0,2.5	08/29/88	8.14	ND	ND	290
A-28	S2-049830,099470-4.5,5.0	08/29/88	10.4	ND	ND	33.0
A-29	S2-050740,098250-0.0,0.5	08/25/88	2.50	8.37	ND	50.41
A-29	S2-050740,098250-2.0,2.5	08/25/88	3.01	3.01	ND	215.18
A-29	S2-050740,098250-4.5,5.0	08/25/88	2.50	2.60	ND	
A-29	S2.050740,098250-4.5,5.0	08/25/88				187.00
A-30	S2-050710,098350-0.0,1.0	08/26/88	2.20	3.84	ND	40.5
A-30	S2-050710,098350-2.0,2.5	08/26/88	5.33	ND	ND	112.8
A-30	S2-050710,098350-4.0,5.0	08/26/88	4.28	ND	ND	59.4
A-30	S2-050710,098350-4.0,5.0-DU	08/26/88	5.96	0.85	ND	85.4
A-31	S2-050830,098410-0.0,1.0	08/26/88	1.72	5.37	ND	43.5
A-31	S2-050830,098410-2.0,2.5	08/26/88	3.30	1.76	ND	71.7
A-31	S2-050830,098410-4.5,5.0	08/26/88	8.10	ND	ND	153
A-32	S2-050680,098410-0.0,1.0	08/26/88	2.28	13.36	ND	40.74
A-32	S2-050680,098410-2.0,2.5	08/26/88	4.06	0.78	ND	48.27
A-32	S2-050680,098410-4.5,5.0	08/26/88	11.19	ND	ND	46.00
A-33	S2-050610,098370-0.0,2.0	08/26/88	4.21	ND	ND	80.18
A-33	S2-050610,098370-2.5,3.0	08/26/88	1.26	ND	ND	217.12
A-33	S2-050610,098370-4.5,5.0	08/26/88	8.16	ND	ND	48.59
A-34	S2-050570,098330-0.0,0.5	08/25/88	ND	12.20	ND	8.84
A-34	S2-050570,098330-2.0,2.5	08/25/88	10.86	ND	ND	55.89
A-34	S2-050570,098330-4.5,5.0	08/25/88	2.92	9.47	ND	56.68

INORGANIC ANION DATA - PHASE II SOILS (continued)

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
A-35	S2-050560,098440-0.0,1.0	08/26/88	5.17	2.53	ND	93.21
A-35	S2-050560,098440-2.0,2.5	08/26/88	2.79	ND	ND	71.87
A-35	S2-050560,098440-4.5,5.0	08/26/88	4.97	ND	ND	180.19
A-36	S2-050670,098610-0.0,1.0	08/26/88	2.92	4.09	ND	75.57
A-36	S2-050670,098610-2.0,2.5	08/26/88	12.84	ND	ND	146.74
A-36	S2-050670,098610-4.0,5.0	08/26/88	12.27	ND	ND	140.28
A-37	S2-050500,100140-0.0,0.5	09/09/88	4.94	0.89	ND	17.5
A-37	S2-050500,100140-2.0,3.0	09/09/88	10.5	2.63	ND	250
A-37	S2-050500,100140-2.0,3.0-DU	09/09/88	11.2	ND	ND	186
A-37	S2-050500,100140-4.5,5.0	09/09/88	7.38	0.89	ND	37.8
A-38	S2-050500,100240-0.0,0.5	09/08/88	9.44	ND	ND	190
A-38	S2-050500,100240-2.0,2.5	09/08/88	11.4	0.87	ND	32.3
A-38	S2-050500,100240-4.5,5.0	09/09/88	8.26	ND	ND	14.9
A-39	S2-050440,100170-0.0,0.5	09/08/88	8.94	ND	ND	20.8
A-39	S2-050440,100170-4.5,5.0	09/08/88	8.26	ND	ND	14.9
A-40	S2-050440,100380-2.0,2.5	09/09/88	8.36	0.71	ND	146
A-40	S2-050440,100380-3.5,5.0	09/09/88	10.2	0.65	ND	23.4
A-40	S2-050440,100380-3.5,5.0-MS	09/09/88	4.55	2.41	2.41	4.95
A-40	S2-050440,100380-3.5,5.0-MSD	09/09/88	2.73	ND	ND	ND
A-41	S2-050440,100450-2.0,2.5	09/09/88	12.0	0.92	ND	3.15
A-41	S2-050440,100450-4.5,5.0	09/09/88	12.0	0.76	ND	68.1
A-42	S2-050310,100520-0.0,0.5	09/12/88	5.89	2.94	ND	11.56
A-42	S2-050310,100520-4.5,5.0	09/12/88	10.56	ND	ND	33.24
A-43	S2-050360,100540-0.0,0.5	09/12/88	6.28	1.57	ND	8.98
A-44	S2-050350,100480-0.0,1.0-DU	09/12/88	4.14	1.57	ND	50.53
A-45	S2-050340,100420-0.0,0.5	09/13/88	5.43	5.77	ND	13.02
A-45	S2-050340,100420-2.0,2.5	09/12/88	5.95	178.40	ND	135.26
A-45	S2-050340,100420-4.5,5.0	09/12/88	2.55	542.19	ND	24.85
A-46	S2-050350,100350-0.0,0.5	10/04/88	5.10	1.46	ND	87.48
A-46	S2-050350,100350-2.0,2.5	10/04/88	2.12	ND	ND	58.12
A-46	S2-050350,100350-4.5,5.0	10/04/88	2.01	ND	ND	58.96
A-47	S2-050370,099830-1.0,1.5	09/13/88	43.46	0.79	ND	43.69
A-47	S2-050370,99830-3.0,4.0	09/13/88	7.82	ND	ND	6.48
A-47	S2-050370,099830-3.0,4.0-MD	09/13/88	1.54	1.47	ND	ND
A-47	S2-050370,099830-3.0,4.0-MS	09/13/88	3.93	2.45	7.73	3.68
A-47	S2-050370,099830-5.5,6.0	09/13/88	6.70	ND	ND	6.35
A-48	S2-050370,099850-1.5,2.0	09/13/88	10.15	0.98	ND	45.19
A-48	S2-050370,099850-3.5,4.0	09/13/88	7.35	ND	ND	ND
A-48	S2-050370,099850-6.0,6.5	09/13/88	8.84	ND	ND	6.13
A-49	S2-050370,099110-1.0,1.5	09/13/88	9.79	1.10	ND	13.59
A-49	S2-050370,099110-3.0,3.5	09/13/88	ND	ND	ND	ND
A-49	S2-050370,099110-5.5,6.0	09/13/88	7.91	ND	ND	ND
A-50	S2-050300,099950-2.0,2.5	09/13/88	8.70	ND	ND	38.36

INORGANIC ANION DATA - PHASE II SOILS (continued)

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
A-50	S2-050300,099950-4.0,5.0	09/13/88	7.34	0.63	ND	20.43
A-50	S2-050300,099950-4.0,5.0DU	09/13/88	7.22	ND	ND	30.52
A-51	S2-050350,099980-0.0,1.0	09/13/88	7.25	ND	ND	14.73
A-51	S2-050350,099980-2.0,2.5	09/13/88	5.76	ND	ND	55.04
A-51	S2-050350,099980-4.0,5.0	09/13/88	4.56	ND	ND	35.73
A-54	S2-050200,099640-0.0,1.0	09/14/88	8.96	1.18	ND	28.41
A-54	S2-050200,099640-0.0,1.0-MS	09/14/88	21.26	10.51	11.22	42.16
A-54	S2-050200,099640-0.0,1.0-MSD	09/14/88	8.67	ND	ND	35.64
A-54	S2-050200,099640-2.0,2.5	09/14/88	7.43	ND	ND	21.71
A-54	S2-050200,099640-4.5,5.0	09/14/88	9.64	2.82	ND	20.80
A-55	S2-050250,099920-2.0,2.5	09/13/88	ND	ND	ND	11.0
A-55	S2-050250,099920-4.5,5.0	09/13/88	8.40	ND	ND	5.10
A-58	S2-050480,100640-2.0,2.5	09/09/88	6.05	0.93	ND	72.7
A-58	S2-050480,100640-4.5,5.0	09/09/88	7.70	ND	ND	36.1
A-61	S2-050525,100525-2.0,2.5	09/09/88	8.29	ND	ND	65.6
A-61	S2-050525,100525-4.5,5.0	09/09/88	9.12	1.07	ND	37.6
A-64	S2-050810,100770-GRAB	09/08/88	ND	ND	ND	7.13
A-65	S2-050360,100660-0.0,0.5	09/07/88	5.25	1.00	ND	40.87
A-65	S2-050360,100660-2.0,3.5	09/07/88	6.83	0.91	ND	15.43
A-65	S2-050360,100660-2.0,3.5-DU	09/07/88	20.29	0.83	ND	12.32
A-65	S2-050360,100660-4.5,5.0	09/07/88	22.61	1.55	ND	17.85
A-72	S2-050460,099600-1.0,2.0	09/14/88	6.26	1.87	ND	12.85
A-72	S2-050460,099600-1.0,2.0-DU	09/14/88	6.08	1.33	ND	16.91
A-72	S2-050460,099600-3.0,4.5	09/14/88	10.61	7.90	ND	68.76
A-72	S2-050460,099600-3.0,4.5-DU	09/14/88	10.88	10.66	ND	61.05
A-73	S2-050520,099770-1.5,3.0	09/14/88	5.62	5.62	2.57	142.74
A-73	S2-050520,099770-1.5,3.0-DU	09/14/88	6.52	9.72	5.93	146.94
A-73	S2-050520,099770-4.5.5.0	09/14/88	5.89	1.08	ND	11.19
A-73	S2-050520,099770-6.0,6.5	09/14/88	11.60	0.95	ND	12.08
A-76	S2-049800,100620-0.0,0.5	08/31/88	3.93	7.42	ND	21.8
A-76	S2-049800,100620-2.0,2.5	08/31/88	5.26	2.80	ND	31.8
A-76	S2-049800,100620-4.5,5.0	08/31/88	4.87	2.38	ND	39.5
A-78	S2-051970,100520-0.0,1.5	09/22/88	2.02	ND	ND	19.75
A-78	S2-051970,100520-0.0,1.5-DU	09/22/88	1.68	ND	ND	23.93
A-78	S2-051970,100520-2.0,2.5	09/22/88	2.14	1.35	ND	63.84
A-78	S2-051970,100520-4.5,5.0	09/22/88	3.40	1.12	ND	10.07
B- 1	S2-044289,104389-0.0,7.0	10/08/88	5.96	5.74	ND	59.64
B- 1	S2-044289,104389-8.0,15.0	10/08/88	3.57	2.38	ND	4.88
B- 2	S2-044195,104655-0.0,7.0	10/08/88	1.56	1.56	ND	12.55
B- 2	S2-044195,104655-8.0,15.0	10/08/88	2.49	24.95	ND	5.90
B- 3	S2-044281,104933-0.0,7.0	10/08/88	2.59	9.93	ND	37.90
B- 3	S2-044281,104933-0.0,7.0-MS	10/08/88	14.40	15.23	10.59	32.37
B- 3	S2-044281,104933-0.0,7.0-MSD	10/08/88	2.04	7.60	ND	18.82

INORGANIC ANION DATA - PHASE II SOILS (continued)

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
B- 3	S2-044281,104933-8.0,15.0	10/08/88	6.85	ND	ND	11.23
B- 4	S2-044234,105105-0.0,7.0	10/08/88	ND	ND	ND	50.35
B- 4	S2-044234,105105-8.0,15.0	10/08/88	2.76	2.04	ND	ND
B- 5	S2-044561,104951-0.0,7.0	10/08/88	6.32	2.81	ND	41.92
B- 5	S2-044561,104951-0.0,7.0-MS	10/08/88	16.70	15.30	10.16	41.00
B- 5	S2-044561,104951-0.0,7.0-MSD	10/08/88	5.94	5.10	ND	62.67
B- 5	S2-044561,104951-8.0,15.0	10/08/88	6.06	3.50	ND	4.78
B- 6	S2-044510,104529-0.0,7.0	10/08/88	4.32	2.34	ND	13.78
B- 6	S2-044510,104529-8.0,15.0	10/08/88	2.49	1.58	ND	5.88
B- 7	S2-044789,104577-0.0,7.0	10/08/88	3.89	6.25	ND	35.40
B- 7	S2-044789,104577-0.0,7.0-MS	10/08/88	16.61	16.97	10.41	40.01
B- 7	S2-044789,104577-0.0,7.0-MSD	10/08/88	2.31	2.08	ND	30.44
B- 7	S2-044789,104577-8.0,15.0	10/08/88	7.23	1.26	ND	8.84
B- 8	S2-044701,105187-0.0,7.0	10/06/88	11.28	0.82	ND	79.98
B- 8	S2-044701,105187-0.0,7.0-DU	10/06/88	13.08	0.99	ND	37.68
B- 8	S2-044701,105187-8.0,15.0	10/06/88	9.43	2.12	ND	6.37
B- 9	S2-044469,105618-0.0,7.0	10/08/88	4.91	4.34	ND	39.36
B- 9	S2-044469,105618-8.0,15.0	10/08/88	4.88	14.05	1.51	9.29
B-10	S2-044261,105997-0.0,7.0	10/08/88	6.73	5.82	ND	29.89
B-10	S2-044261,105997-8.0,15.0	10/08/88	2.70	97.44	ND	6.46
B-11	S2-044289,104901-0.0,7.0	10/08/88	2.72	3.19	ND	32.83
B-11	S2-044289,104901-8.0,15.0	10/08/88	3.50	1.40	ND	7.94
B-12	S2-045023,105290-0.0,7.0	10/06/88	2.69	ND	ND	44.35
B-12	S2-045023,105290-8.0,15.0	10/06/88	6.21	11.37	ND	22.15
B-12	S2-045023,105290-8.0,15.0-MS	10/06/88	17.77	16.95	14.24	57.32
B-12	S2-045023,105290-8.0,15.0-MSD	10/06/88	5.95	5.47	ND	51.88
B-13	S2-044836,105520-0.0,7.0	10/06/88	2.95	15.18	ND	46.68
B-13	S2-044836,105520-0.0,7.0-MS	10/06/88	15.87	17.22	12.33	54.46
B-13	S2-044836,105520-0.0,7.0-MSD	10/06/88	4.53	8.94	ND	55.90
B-13	S2-044836,105520-8.0,15.0	10/06/88	9.12	2.01	ND	8.30
B-13	S2-044836,105520-8.0,15.0-DU	10/06/88	8.81	2.02	ND	9.16
B-14	S2-044670,105980-0.0,7.0	10/06/88	5.31	1.81	ND	115.16
B-14	S2-044670,105980-8.0,15.0	10/06/88	12.67	3.64	ND	7.16
B-14	S2-044670,105980-8.0,15.0-DU	10/06/88	13.37	4.27	ND	7.15
B-15	S2-044321,106293-0.0,7.0	10/06/88	8.88	2.88	ND	77.25
B-15	S2-044321,106293-8.0,15.0	10/06/88	15.35	1.56	ND	14.75
B-15	S2-044321,106293-8.0,15.0-DU	10/06/88	15.34	2.73	ND	17.36
B-16	S2-044143,106675-0.0,7.0	10/06/88	8.47	ND	ND	81.88
B-16	S2-044143,106675-0.0,7.0-DU	10/06/88	7.98	ND	ND	46.76
B-16	S2-044143,106675-8.0,15.0	10/06/88	10.60	ND	ND	38.40
B-17	S2-045353,105253-0.0,7.0	10/06/88	4.01	3.44	ND	46.37
B-17	S2-045353,105253-0.0,7.0-DU	10/06/88	2.29	4.59	ND	33.26
B-17	S2-045353,105253-8.0,15.0	10/06/88	3.20	1.08	ND	ND

INORGANIC ANION DATA - PHASE II SOILS (continued)

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
B-18	S2-045014,105878-0.0,7.0	10/06/88	5.22	4.65	ND	50.85
B-18	S2-045014,105878-0.0,7.0-DU	10/06/88	4.76	4.76	ND	ND
B-18	S2-045014,105878-8.0,15.0-DU	10/06/88	4.66	5.00	ND	47.14
B-18	S2-045014,105878-8.0,15.0	10/06/88	5.57	5.10	ND	ND
B-19	S2-044836,106310-0.0,7.0	10/06/88	3.40	5.38	ND	48.53
B-19	S2-044836,106310-8.0,15.0	10/06/88	9.45	23.34	ND	14.35
B-20	S2-044524,106625-0.0,7.0	10/06/88	5.03	6.48	ND	119.63
B-20	S2-044524,106625-0.0,7.0-DU	10/06/88	5.00	3.56	ND	61.16
B-20	S2-044524,106625-8.0,15.0	10/06/88	11.31	15.71	ND	21.78
B-21	S2-044327,106997-0.0,7.0	10/06/88	7.21	ND	ND	21.07
B-21	S2-044327,106997-0.0,7.0-DU	10/06/88	6.16	0.75	ND	29.53
B-21	S2-044327,106997-8.0,15.0	10/06/88	15.82	ND	ND	ND
B-22	S2-045515,105614-0.0,7.0	10/06/88	4.75	0.83	ND	27.24
B-22	S2-045515,105614-8.0,15.0	10/06/88	2.16	ND	ND	13.47
B-23	S2-045388,105951-0.0,7.0	10/06/88	2.61	3.06	ND	32.52
B-23	S2-045388,105951-8.0,15.0	10/06/88	2.83	7.54	ND	12.13
B-23	S2-045388,105951-8.0,15.0-MS	10/06/88	14.92	21.87	14.16	14.79
B-23	S2-045388,105951-8.0,15.0-MSD	10/06/88	4.03	8.43	ND	5.13
B-24	S2-045027,106627-0.0,7.0	10/06/88	6.95	2.90	ND	69.08
B-24	S2-045027,106627-8.0,15.0	10/06/88	13.85	3.79	ND	15.63
B-24	S2-045027,106627-8.0,15.0-DU	10/06/88	3.68	3.68	ND	38.31
B-25	S2-044781,107039-0.0,7.0	10/06/88	7.85	5.31	ND	71.32
B-25	S2-044781,107039-8.0,15.0	10/06/88	10.56	80.72	ND	28.73
B-25	S2-044781,107039-8.0,15.0-DU	10/06/88	4.27	66.95	ND	34.90
C-	S2-050400,099985-6.0,8.0	09/23/88	5.18	6.78	ND	27.99
C- 1	S2-049370,100740-0.0,2.0	09/28/88	3.88	5.29	ND	63.57
C- 1	S2-049370,100740-10.0,12.0	09/28/88	5.50	3.86	ND	12.17
C- 1	S2-049370,100740-2.0,4.0	09/28/88	5.74	1.10	ND	5.86
C- 1	S2-049370,100740-4.0,6.0	09/28/88	3.95	ND	ND	4.91
C- 1	S2-049370,100740-6.0,8.0	09/28/88	2.92	ND	ND	6.89
C- 1	S2-049370,100740-6.0,8.0-DU	09/28/88	6.02	ND	ND	13.81
C- 1	S2-049370,100740-8.0,10.0	09/28/88	5.83	1.51	ND	14.21
C- 1	S2-049370,100740-8.0,10.0-DU	09/28/88	3.72	1.28	ND	13.27
C- 2	S2-049425,100725-0.0,2.0	09/29/88	3.79	5.02	ND	15.94
C- 2	S2-049425,100725-10.0,12.0	09/29/88	2.48	ND	ND	164
C- 2	S2-049425,100725-12.0,14.0	09/29/88	7.07	ND	ND	26.86
C- 2	S2-049425,100725-2.0,4.0	09/29/88	2.95	1.65	ND	15.56
C- 2	S2-049425,100725-4.0,6.0	09/29/88	3.39	1.89	ND	6.91
C- 2	S2-049425,100725-6.0,8.0	09/29/88	1.92	ND	ND	335.08
C- 2	S2-049425,100725-8.0,10.0	09/29/88	1.66	ND	ND	132
C- 3	S2-049410,100758-0.0,2.0	09/28/88	3.09	ND	ND	21.96
C- 3	S2-049410,100758-10.0,12.0	09/28/88	3.46	ND	ND	4.73
C- 3	S2-049410,100758-12.0,14.0	09/28/88	4.71	ND	ND	ND

INORGANIC ANION DATA - PHASE II SOILS (continued)

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
C- 3	S2-049410,100758-12.0,14.0-DU	09/28/88	3.57	ND	ND	ND
C- 3	S2-049410,100758-2.0,4.0	09/28/88	2.79	ND	ND	24.14
C- 3	S2-049410,100758-2.0,4.0-MS	09/28/88	13.44	12.96	12.72	34.72
C- 3	S2-049410,100758-2.0,4.0-MSD	09/28/88	2.62	ND	ND	16.32
C- 3	S2-049410,100758-4.0,6.0	09/28/88	4.28	ND	ND	12.47
C- 3	S2-049410,100758-6.0,8.0	09/28/88	2.89	ND	ND	6.83
C- 3	S2-049410,100758-8.0,10.0	09/28/88	4.89	ND	ND	8.39
C- 4	S2-049468,100712-0.0,2.0	09/29/88	4.30	1.21	ND	8.16
C- 4	S2-049468,100712-2.0,4.0	09/29/88	12.40	ND	ND	11.13
C- 4	S2-049468,100712-4.0,6.0	09/29/88	3.71	ND	ND	16.28
C- 4	S2-049468,100712-6.0,8.0	09/29/88	4.92	1.18	ND	40.47
C- 4	S2-049468,100712-6.0,8.0-DU	09/29/88	4.15	ND	ND	41.55
C- 4	S2-049468,100712-8.0,10.0	09/29/88	6.13	ND	ND	60.63
C- 4	S2-049468,100712-10.0,12.0	09/29/88	4.09	1.10	ND	10.75
C- 4	S2-049468,100712-12.0,14.0	09/29/88	4.46	1.17	ND	4.93
C- 5	S2-049475,100770-0.0,2.0	09/29/88	4.70	4.37	ND	6.44
C- 5	S2-049475,100770-2.0,4.0	09/29/88	2.65	ND	ND	13.50
C- 5	S2-049475,100770-4.0,6.0	09/29/88	2.53	ND	ND	18.57
C- 5	S2-049475,100770-6.0,8.0	09/29/88	2.57	ND	ND	148.23
C- 5	S2-049475,100770-8.0,10.0	09/29/88	2.85	50.61	ND	6.89
C- 5	S2-049475,100770-10.0,12.0	09/29/88	4.72	ND	ND	23.95
C- 5	S2-049475,100770-12.0,14.0	09/29/88	3.54	1.83	ND	19.92
C- 6	S2-049450,100450-0.0,2.0	08/31/88	3.36	1.79	ND	32.2
C- 6	S2-049450,100450-10.0,12.0	08/31/88	ND	ND	ND	6.08
C- 6	S2-049450,100450-12.0,14.0	08/31/88	2.03	ND	ND	13.8
C- 6	S2-049450,100450-14.0,16.0	08/31/88	3.97	ND	ND	15.2
C- 6	S2-049450,100450-2.0,4.0	08/31/88	3.82	ND	ND	71.4
C- 6	S2-049450,100450-4.0,6.0	08/31/88	1.40	ND	ND	300
C- 6	S2-049450,100450-6.0,8.0	08/31/88	2.26	ND	ND	60.0
C- 6	S2-049450,100450-6.0,8.0-DU	08/31/88	3.02	ND	ND	110
C- 6	S2-049450,100450-8.0,10.0	08/31/88	2.66	ND	ND	13.8
C- 7	S2-049583,100650-0.0,2.0	08/31/88	4.57	ND	ND	28.1
C- 7	S2-049583,100650-2.0,4.0	08/31/88	1.89	1.06	ND	92.1
C- 7	S2-049583,100650-4.0,6.0	08/31/88	2.85	ND	ND	9.72
C- 7	S2-049583,100650-6.0,8.0	08/31/88	1.94	ND	ND	10.4
C- 7	S2-049583,100650-8.0,10.0	08/31/88	2.41	ND	ND	7.23
C- 7	S2-049583,100650-10.0,12.0	08/31/88	1.99	ND	ND	14.9
C- 7	S2-049583,100650-12.0,14.0	08/31/88	ND	ND	ND	18.1
C- 7	S2-049583,100650-14.0,16.0	08/31/88	ND	ND	ND	27.1
C- 7	S2-049583,100650-16.0,18.0	08/31/88	ND	ND	ND	6.87
C- 7	S2-049583,100650-16.0,18.0-MS	08/31/88	13.2	11.1	6.89	16.9
C- 7	S2-049583,100650-16.0,18.0-MSD	08/31/88	ND	ND	ND	7.32
C- 7	S2-049583,100650-18.0,20.0	08/31/88	1.77	ND	ND	11.8

INORGANIC ANION DATA - PHASE II SOILS (continued)

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
C- 8	S2-049635,100850-2.0,4.0	08/31/88	3.64	2.85	ND	19.2
C- 8	S2-049635,100850-6.0,8.0	08/31/88	4.33	3.28	ND	30.7
C- 8	S2-049635,100850-10.0,12.0	08/31/88	6.03	1.69	ND	60.3
C- 8	S2-049635,100850-10.0,12.0-DU	08/31/88	8.51	0.72	ND	23.6
C- 8	S2-049635,100850-14.0,16.0	08/31/88	4.39	ND	ND	29.8
C- 8	S2-049635,100850-18.0,20.0	08/31/88	2.41	ND	ND	40.8
C- 9	S2-049625,101000-0.0,2.0	09/01/88	3.67	9.30	ND	18.02
C- 9	S2-049625,101000-2.0,4.0	09/01/88	5.65	2.82	ND	19.1
C- 9	S2-049625,101000-4.0,6.0	09/01/88	2.58	5.27	ND	30.8
C- 9	S2-049625,101000-6.0,8.0	09/01/88	2.31	11.6	ND	31.4
C- 9	S2-049625,101000-8.0,10.0	09/01/88	3.93	11.2	ND	54.5
C- 9	S2-049625,101000-10.0,12.0	09/01/88	2.31	4.16	ND	33.4
C-10	S2-050040,101285-0.0,2.0	09/29/88	1.54	2.09	ND	84.19
C-10	S2-050040,101285-0.0,2.0-MS	09/29/88	11.59	14.85	11.48	61.99
C-10	S2-050040,101285-0.0,2.0-MSD	09/29/88	ND	1.77	ND	67.81
C-10	S2-050040,101285-2.0,4.0	09/29/88	1.66	2.11	ND	56.23
C-10	S2-050040,101285-4.0,6.0	09/29/88	4.73	3.23	ND	9.92
C-11	S2-050055,101215-0.0,2.0	09/29/88	3.62	1.21	ND	19.43
C-11	S2-050055,101215-2.0,4.0	09/29/88	2.65	1.44	ND	24.77
C-11	S2-050055,101215-4.0,6.0	09/29/88	3.77	ND	ND	24.75
C-12	S2-050100,101240-0.0,2.0	09/29/88	3.56	1.56	ND	10.13
C-12	S2-050100,101240-2.0,4.0	09/29/88	4.00	1.13	ND	169.02
C-12	S2-050100,101240-2.0,4.0-DU	09/29/88	4.57	1.49	ND	174.88
C-12	S2-050100,101240-4.0,6.0	09/29/88	2.64	1.10	ND	124.30
C-13	S2-050140,101255-0.0,2.0	09/29/88	5.61	4.66	ND	27.94
C-13	S2-050140,101255-2.0,4.0	09/29/88	6.19	1.12	ND	232.64
C-13	S2-050140,101255-2.0,4.0-DU	09/29/88	3.96	1.24	ND	242.95
C-13	S2-050140,101255-4.0,6.0	09/29/88	4.86	1.07	ND	57.83
C-13	S2-050140,101255-6.0,8.0	09/29/88	3.53	1.61	ND	ND
C-14	S2-050550,101050-0.0,2.0	09/07/88	ND	0.87	ND	42.97
C-14	S2-050550,101050-2.0,4.0	09/07/88	4.28	0.88	ND	131.98
C-14	S2-050550,101050-4.0,6.0	09/07/88	5.28	0.74	ND	9.50
C-14	S2-050550,101050-4.0,6.0-DU	09/07/88	5.70	0.90	ND	7.72
C-14	S2-050550,101050-6.0,8.0	09/07/88	6.36	0.80	ND	9.66
C-14	S2-050550,101050-10.0,12.0	09/07/88	4.78	0.84	ND	32.95
C-14	S2-050550,101050-12.0,14.0	09/07/88	5.08	0.72	ND	7.32
C-14	S2-050550,101050-12.0,14.0-MS	09/07/88	16.08	12.21	10.92	17.84
C-14	S2-050550,101050-12.0,14.0-MSD	09/07/88	3.03	0.82	ND	6.64
C-15	S2-050550,101000-0.0,2.0	09/06/88	ND	1.26		320.57
C-15	S2-050550,101000-0.0,2.0-FB	09/06/88	2.51	1.04	ND	295.78
C-15	S2-050550,101000-2.0,4.0	09/06/88	3.31	0.83	ND	194.87
C-15	S2-050550,101000-4.0,6.0	09/06/88	6.56	0.78	ND	30.71
C-15	S2-050550,101000-6.0,8.0	09/06/88	4.15	0.79	ND	29.35

INORGANIC ANION DATA - PHASE II SOILS (continued)

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
C-15	S2-050550,101000-8.0,10.0	09/06/88	9.45	0.74	ND	16.23
C-15	S2-050550,101000-10.0,12.0	09/06/88	4.72	0.74	ND	24.68
C-15	S2-050550,101000-12.0,14.0	09/06/88	4.36	0.85	ND	19.15
C-15	S2-050550,101000-14.0,16.0	09/06/88	4.33	3.76	ND	ND
C-15	S2-050550,101000-18.0,20.0	09/06/88	3.01	2.05	ND	20.12
C-15	S2-050550,101000-18.0,20.0-DU	09/06/88	2.76	2.04	ND	14.03
C-16	S2-050550,100950-0.0,2.0	09/02/88	10.00	1.65	ND	335.45
C-16	S2-050550,100950-2.0,4.0	09/02/88	6.08	1.19	ND	223.10
C-16	S2-050550,100950-4.0,6.0	09/02/88	8.62	1.00	ND	21.85
C-16	S2-050550,100950-6.0,8.0	09/02/88	12.54	1.00	ND	23.12
C-16	S2-050550,100950-8.0,10.0	09/02/88	6.39	0.89	ND	16.87
C-16	S2-050550,100950-10.0,12.0	09/02/88	7.04	0.93	ND	20.62
C-16	S2-050550,100950-12.0,14.0	09/02/88	8.62	0.95	ND	16.76
C-16	S2-050550,100950-14.0,16.0	09/02/88	7.66	1.00	ND	16.06
C-16	S2-050550,100950-16.0,18.0	09/02/88	6.55	0.91	ND	15/77
	S2-051700,100850-0.0,1.0	09/26/88	ND	1.33	ND	20.24
C-71	S2-051745,100925-0.0,1.0	09/26/88	ND	18.86	1.86	16.12
C-72	S2-051770,100920-0.0,1.0	09/26/88	1.75	16.55	1.64	12.82
C-73	S2-052400,100700-0.0,1.0	09/19/88	4.67	3.64	ND	18.32
C-74	S2-052350,100700-0.0,1.0	09/19/88	4.89	6.83	ND	15.48
C-74	S2-052350,100700-0.0,1.0-DU	09/19/88	5.06	5.75	ND	15.05
C-75	S2-049450,100870-0.0,2.0	09/28/88	2.85	1.37	ND	26.65
C-75	S2-049450,100870-0.0,2.0-MS	09/28/88	14.78	14.00	11.55	28.00
C-75	S2-049450,100870-0.0,2.0-MSD	09/28/88	4.48	1.61	ND	28.40
C-75	S2-049450,100870-10.0,12.0	09/28/88	2.99	ND	ND	20.1
C-75	S2-049450,100870-12.0,14.0	09/28/88	2.88	ND	ND	22.84
C-75	S2-049450,100870-2.0,4.0	09/28/88	3.18	ND	ND	42.21
C-75	S2-049450,100870-2.0,4.0-DU	09/28/88	1.74	ND	ND	39.57
C-75	S2-049450,100870-4.0,6.0	09/28/88	4.29	ND	ND	28.70
C-75	S2-049450,100870-6.0,8.0	09/28/88	3.96	0.73	ND	19.32
C-75	S2-049450,100870-8.0,10.0	09/28/88	2.88	ND	ND	26.68
D-	S2-050550,098350-0.0,7.0	08/26/88	6.14	ND	ND	81.00
D- 1	S2-051500,101800-0.0,7.0	10/04/88	2.41	ND	ND	35.33
D- 1	S2-051500,101800-8.0,15.0	10/04/88	2.35	0.95	ND	5.93
D- 2	S2-051000,101800-0.0,7.0	10/03/88	4.19	0.83	ND	155.22
D- 2	S2-051000,101800-8.0,15.0	10/03/88	5.06	3.15	ND	6.63
D- 3	S2-051750,101600-0.0,7.0	10/03/88	2.23	2.01	ND	22.84
D- 3	S2-051750,101600-8.0,15.0	10/03/88	2.93	1.24	ND	9.14
D- 4	S2-051250,101600-0.0,7.0	10/04/88	ND	5.08	ND	33.16
D- 4	S2-051250,101600-8.0,15.0	10/04/88	2.30	ND	ND	18.17
D- 5	S2-050700,101600-0.0,7.0	10/04/88	1.78	0.99	ND	38.07
D- 5	S2-050700,101600-8.0,15.0	10/04/88	4.04	ND	ND	5.83
D- 5	S2-050700,101600-8.0,15.0-MS	10/04/88	15.5	13.6	12.7	15.8

INORGANIC ANION DATA - PHASE II SOILS (continued)

BHOL #	COORDINATES AND DEPTHS	DATE SAMPLED	Fluoride	Nitrate	Nitrite	Sulfate
			DETECTION LIMITS - UG/G			
			1.25	0.5	0.5	5.0
			CONCENTRATIONS - UG/G			
D- 5	S2-050700,101600-8.0,15.0-MSD	10/04/88	4.16	ND	ND	6.01
D- 6	S2-050200,101600-0.0,7.0	10/04/88	1.19	3.89	ND	27.14
D- 6	S2-050200,101600-0.0,7.0-MS	10/04/88	13.64	18.22	12.00	27.28
D- 6	S2-050200,101600-0.0,7.0-MSD	10/04/88	2.06	4.11	ND	17.75
D- 6	S2-050200,101600-8.0,15.0	10/04/88	ND	ND	ND	ND
D- 8	S2-051750,101330-0.0,7.0	09/26/88	4.18	ND	ND	43.99
D- 8	S2-051750,101330-8.0,15.0	09/26/88	4.75	ND	ND	10.07
D- 9	S2-051250,101300-0.0,7.0	09/23/88	4.86	ND	ND	72.20
D- 9	S2-051250,101300-8.0,15.0	09/23/88	4.43	2.75	2.51	27.03
D-10	S2-050700,101300-0.0,7.0	09/07/88	5.24	1.63	ND	86.21
D-10	S2-050700,101300-8.0,15.0	09/07/88	3.28	0.95	ND	ND
D-10	S2-050700,101300-8.0,15.0-DU	09/07/88	3.60	1.13	ND	ND
D-11	S2-050250,101300-0.0,7.0	09/29/88	6.24	3.29	ND	30.00
D-11	S2-050250,101300-8.0,15.0	09/29/88	3.08	2.42	ND	ND
D-11	S2-050250,101300-8.0,15.0-DU	09/29/88	2.03	2.82	ND	ND
D-12	S2-049690,101250-0.0,7.0	10/04/88	7.5	2.9	2.39	8.0
D-91	S2-050800,098150-8.0,15.0-MSD	08/25/88	5.2	0.9	N	

CHEMSOIL/TXTJOANN

APPENDIX C
SEMI-VOLATILE ORGANIC COMPOUND DATA

APPENDIX C
DETECTED SEMIVOLATILE COMPOUNDS

SAMPLING LOCATION	PARAMETER	CONC. ug/kg	COMM.	DETECTION LIMITS
S2-049310,100740-8.0,15.0	bis(2-ethylhexyl)phthalate	50	J	330
S2-049500,100020-0.0,7.0	Naphthalene	220		330
S2-049500,100020-0.0,7.0	Butyl Benzyl Phthalate	670		330
S2-049500,100020-0.0,7.0	1,2-Dichlorobenzene	46	J	330
S2-049500,100020-0.0,7.0	bis(2-ethylhexyl)phthalate	15000		330
S2-049500,100020-0.0,7.0	Di-n-butylphthalate	2700		330
S2-049500,100900-8.0,15.0	bis(2-ethylhexyl)phthalate	40	J	330
S2-049700,099550-0.0,2.0	Di-n-butylphthalate	40	J	330
S2-049700,099550-2.5,3.0	Di-n-butylphthalate	56	J	330
S2-049720,099050-0.0,7.0-DU	Fluoranthene	40	J	330
S2-049720,099050-0.0,7.0-DU	bis(2-ethylhexyl)phthalate	750		330
S2-049720,099650-0.0,7.0	bis(2-ethylhexyl)phthalate	530		330
S2-049720,099650-0.0,7.0-RE	bis(2-ethylhexyl)phthalate	1100		330
S2-049725,100675-0.0,0.5	Pyrene	100	J	330
S2-049725,100675-0.0,0.5	Benzo(a)pyrene	50	J	330
S2-049725,100675-0.0,0.5	Di-n-octyl Phthalate	50	J	330
S2-049725,100675-0.0,0.5	Fluoranthene	80	J	330
S2-049725,100675-0.0,0.5	Benzo(b)fluoranthene	50	J	330
S2-049725,100675-0.0,0.5	Phenanthrene	40	J	330
S2-049740,100970-2.0,4.0	Diethylphthalate	40	J	330
S2-049740,100970-2.0,4.0	Di-n-octyl Phthalate	80	J	330
S2-049775,099975-0.0,0.5	Fluoranthene	66	J	330
S2-049775,099975-0.0,0.5	Pyrene	72	J	330
S2-049775,099975-0.0,0.5	Benzo(k)fluoranthene	40	J	330
S2-049800,100620-0.0,0.5	Fluoranthene	11000	E	330
S2-049800,100620-0.0,0.5	Benzo(a)anthracene	8200		330
S2-049800,100620-0.0,0.5	2-Methylnaphthalene	110	J	330
S2-049800,100620-0.0,0.5	Anthracene	3400		330
S2-049800,100620-0.0,0.5	Pyrene	17000	E	330
S2-049800,100620-0.0,0.5	Dibenzofuran	820		330
S2-049800,100620-0.0,0.5	Indeno(1,2,3-cd)pyrene	3200		330
S2-049800,100620-0.0,0.5	Fluorene	1600		330
S2-049800,100620-0.0,0.5	Chrysene	8000		330
S2-049800,100620-0.0,0.5	Benzo(a)pyrene	5100		330
S2-049800,100620-0.0,0.5	Naphthalene	160	J	330
S2-049800,100620-0.0,0.5	Benzo(b)fluoranthene	4600		330
S2-049800,100620-0.0,0.5	Acenaphthene	1900		330
S2-049800,100620-0.0,0.5	Phenanthrene	11000	E	330
S2-049800,100620-0.0,0.5	Benzo(g,h,i)perylene	2100		330
S2-049800,100620-0.0,0.5	Benzo(k)fluoranthene	3900		330
S2-049800,100620-2.0,2.5	Pyrene	80	J	330
S2-049800,100620-2.0,2.5	Diethylphthalate	80	J	330

J - DETECTED BELOW REQUIRED DETECTION LIMIT
E - ESTIMATED

APPENDIX C
DETECTED SEMIVOLATILE COMPOUNDS

SAMPLING LOCATION	PARAMETER	CONC. ug/kg	COMM.	DETECTION LIMITS
S2-049800,100620-4.5,5.0	Diethylphthalate	60	J	330
S2-049830,099470-0.0,1.0	Fluoranthene	106	J	330
S2-049830,099470-0.0,1.0	Benzo(a)anthracene	35	J	330
S2-049830,099470-0.0,1.0	Pyrene	142	J	330
S2-049830,099470-0.0,1.0	Di-n-butylphthalate	213	J	330
S2-049830,099470-0.0,1.0	Phenanthrene	71	J	330
S2-049830,099470-0.0,1.0	Chrysene	71	J	330
S2-049860,099340-0.0,1.0	Chrysene	177	J	330
S2-049860,099340-0.0,1.0	Phenanthrene	177	J	330
S2-049860,099340-0.0,1.0	Benzo(b)fluoranthene	177	J	330
S2-049860,099340-0.0,1.0	2-Methylnaphthalene	106	J	330
S2-049860,099340-0.0,1.0	Di-n-butylphthalate	71	J	330
S2-049860,099340-0.0,1.0	Pyrene	354		330
S2-049860,099340-0.0,1.0	Benzo(a)anthracene	142	J	330
S2-049860,099340-0.0,1.0	Fluoranthene	248	J	330
S2-049870,099440-0.0,0.5	Di-n-butylphthalate	630		330
S2-049870,099440-4.5,5.0	Di-n-butylphthalate	50	J	330
S2-049870,099440-4.5,5.0	bis(2-ethylhexyl)phthalate	790		330
S2-049890,100840-0.0,0.5	Pyrene	55	J	330
S2-049890,100840-4.5,5.0-DU	Diethylphthalate	57	J	330
S2-049910,099830-2.0,2.5	Di-n-butylphthalate	63	J	330
S2-049910,099830-3.0,5.0	Di-n-butylphthalate	110	J	330
S2-050000,099200-0.0,7.0	Fluoranthene	41	J	330
S2-050000,099200-0.0,7.0	Phenanthrene	41	J	330
S2-050000,099200-0.0,7.0	Pyrene	82	J	330
S2-050000,100020-0.0,7.0	Di-n-octyl Phthalate	40	J	330
S2-050000,100900-0.0,7.0	Benzo(b)fluoranthene	130	J	330
S2-050000,100900-0.0,7.0	Chrysene	150	J	330
S2-050000,100900-0.0,7.0	Benzo(a)anthracene	120	J	330
S2-050000,100900-0.0,7.0	Benzo(a)pyrene	140	J	330
S2-050000,100900-0.0,7.0	Indeno(1,2,3-cd)pyrene	80	J	330
S2-050000,100900-0.0,7.0	Pyrene	320	J	330
S2-050000,100900-0.0,7.0	Benzo(g,h,i)perylene	170	J	330
S2-050000,100900-0.0,7.0	Fluoranthene	240	J	330
S2-050000,100900-0.0,7.0	Phenanthrene	160	J	330
S2-050010,099430-0.0,7.0	bis(2-ethylhexyl)phthalate	360		330
S2-050075,099400-0.0,1.0	Chrysene	120	J	330
S2-050075,099400-0.0,1.0	Pyrene	160	J	330
S2-050075,099400-0.0,1.0	Di-n-butylphthalate	1100		330
S2-050075,099400-0.0,1.0	Benzo(g,h,i)perylene	200	J	330
S2-050075,099400-0.0,1.0	Benzo(a)anthracene	90	J	330
S2-050075,099400-0.0,1.0	Fluoranthene	280	J	330

J - DETECTED BELOW REQUIRED DETECTION LIMIT

APPENDIX C
DETECTED SEMIVOLATILE COMPOUNDS

SAMPLING LOCATION	PARAMETER	CONC. ug/kg	COMM.	DETECTION LIMITS
S2-050075,099400-0.0,1.0	Benzo(a)pyrene	90	J	330
S2-050075,099400-0.0,1.0	Phenanthrene	110	J	330
S2-050075,099400-2.0,2.5	bis(2-ethylhexyl)phthalate	100	J	330
S2-050075,099400-4.5,5.0	bis(2-ethylhexyl)phthalate	370	J	330
S2-050100,100730-0.0,1.0-DU	Pyrene	50	J	330
S2-050100,100730-0.0,1.0-DU	Fluoranthene	60	J	330
S2-050100,100730-2.0,2.5	Pyrene	80	J	330
S2-050100,100730-2.0,2.5	Fluoranthene	100	J	330
S2-050100,100730-4.5,5.0	bis(2-ethylhexyl)phthalate	140	J	330
S2-050125,100080-2.0,2.5	bis(2-ethylhexyl)phthalate	80	J	330
S2-050250,098750-0.0,7.0	Di-n-butylphthalate	210	J	330
S2-050310,100520-0.0,0.5	bis(2-ethylhexyl)phthalate	2405		330
S2-050350,100480-0.0,1.0	bis(2-ethylhexyl)phthalate	1100		330
S2-050350,100480-0.0,1.0-DU	bis(2-ethylhexyl)phthalate	2700		330
S2-050360,100660-2.0,3.5-DU	bis(2-ethylhexyl)phthalate	140	J	330
S2-050460,099600-1.0,2.0	bis(2-ethylhexyl)phthalate	70	J	330
S2-050460,099600-1.0,2.0-DU	Pyrene	50	J	330
S2-050460,099600-1.0,2.0-DU	Fluoranthene	40	J	330
S2-050460,099600-3.0,4.5	Pyrene	40	J	330
S2-050500,100900-0.0,7.0	Naphthalene	69	J	330
S2-050500,100900-0.0,7.0	Phenanthrene	150	J	330
S2-050500,100900-0.0,7.0	2-Methylnaphthalene	160	J	330
S2-050500,100900-0.0,7.0	Dibenzofuran	68	J	330
S2-050500,100900-0.0,7.0	Pyrene	65	J	330
S2-050510,099430-8.0,15.0	bis(2-ethylhexyl)phthalate	40	J	330
S2-050510,099530-4.0,5.5-DU	bis(2-ethylhexyl)phthalate	130	J	330
S2-050520,099770-1.5,3.0-DU	bis(2-ethylhexyl)phthalate	110	J	330
S2-050550,098790-8.0,15.0	bis(2-ethylhexyl)phthalate	3497		330
S2-050550,099000-0.0,7.0	bis(2-ethylhexyl)phthalate	699		330
S2-050550,099000-0.0,7.0	bis(2-ethylhexyl)phthalate	833		330
S2-050550,099000-0.0,7.0-DU	bis(2-ethylhexyl)phthalate	633		330
S2-050550,100950-0.0,1.0	Hexachlorocyclopentadiene	85	J	330
S2-050550,100950-0.0,1.0	Phenanthrene	74	J	330
S2-050550,100950-4.0,5.0	Di-n-butylphthalate	67	J	330
S2-050550,101070-0.0,1.5	Naphthalene	210	J	330
S2-050550,101070-0.0,1.5	Phenanthrene	420		330
S2-050550,101070-0.0,1.5	2-Methylnaphthalene	520		330
S2-050550,101070-0.0,1.5	Dibenzofuran	190	J	330
S2-050550,101210-0.0,1.0	Chrysene	390	J	330
S2-050550,101210-0.0,1.0	Anthracene	290	J	330
S2-050550,101210-0.0,1.0	Benzo(a)anthracene	410	J	330
S2-050550,101210-0.0,1.0	Pyrene	640		330
S2-050550,101210-0.0,1.0	Fluoranthene	580		330

J - DETECTED BELOW REQUIRED DETECTION LIMIT

CHEMSOIL/TXTJOANN

APPENDIX C

DETECTED SEMIVOLATILE COMPOUNDS

SAMPLING LOCATION	PARAMETER	CONC. ug/kg	COMM.	DETECTION LIMITS
S2-050550,101210-0.0,1.0	Phenanthrene	3100		330
S2-050550,101210-0.0,1.0	Dibenzofuran	1900		330
S2-050550,101210-0.0,1.0	2-Methylnaphthalene	4600		330
S2-050550,101210-0.0,1.0	Naphthalene	1800		330
S2-050550,101210-0.0,1.0-DU	Fluoranthene	530		330
S2-050550,101210-0.0,1.0-DU	Dibenzofuran	1900		330
S2-050550,101210-0.0,1.0-DU	4-Chloroaniline	830		330
S2-050550,101210-0.0,1.0-DU	Naphthalene	1700		330
S2-050550,101210-0.0,1.0-DU	2-Methylnaphthalene	4900		330
S2-050550,101210-0.0,1.0-DU	Phenanthrene	3300		330
S2-050550,101210-0.0,1.0-DU	Chrysene	410		330
S2-050550,101210-0.0,1.0-DU	Pyrene	650		330
S2-050550,101210-0.0,1.0-DU	Benzo(a)anthracene	390		330
S2-050550,101210-0.0,1.0-DU	Anthracene	340	J	330
S2-050550,101210-2.0,3.5	Fluoranthene	80	J	330
S2-050550,101210-2.0,3.5	Naphthalene	330	J	330
S2-050550,101210-2.0,3.5	Pyrene	110	J	330
S2-050550,101210-2.0,3.5	2-Methylnaphthalene	710		330
S2-050550,101210-2.0,3.5	Dibenzofuran	230	J	330
S2-050550,101210-2.0,3.5	Benzo(a)anthracene	70	J	330
S2-050550,101210-2.0,3.5	Anthracene	50	J	330
S2-050550,101210-2.0,3.5	Chrysene	60	J	330
S2-050550,101210-2.0,3.5	Phenanthrene	430	J	330
S2-050550,101210-2.0,3.5-DU	Naphthalene	120	J	330
S2-050550,101210-2.0,3.5-DU	2-Methylnaphthalene	320	J	330
S2-050550,101210-2.0,3.5-DU	Dibenzofuran	120	J	330
S2-050550,101210-2.0,3.5-DU	Phenanthrene	260	J	330
S2-050550,101210-4.5,5.0	2-Methylnaphthalene	48	J	330
S2-050560,098440-0.0,1.0	bis(2-ethylhexyl)phthalate	533		330
S2-050560,098440-4.5,5.0	Di-n-butylphthalate	133	J	330
S2-050610,098370-2.5,3.0	Di-n-butylphthalate	67	J	330
S2-050610,098370-4.5,5.0	Butyl Benzyl Phthalate	67	J	330
S2-050660,100940-0.0,1.5	bis(2-ethylhexyl)phthalate	210	J	330
S2-050660,100940-0.0,1.5-DU	bis(2-ethylhexyl)phthalate	170	J	330
S2-050660,100940-2.0,2.5	bis(2-ethylhexyl)phthalate	60	J	330
S2-050660,100940-3.5,5.0	2-Methylnaphthalene	40	J	330
S2-050680,098410-2.0,2.5	Benzoic Acid	33	J	1600
S2-050680,098410-2.0,2.5	Di-n-butylphthalate	33	J	330
S2-050680,098410-4.5,5.0	Di-n-butylphthalate	33	J	330
S2-050750,100770-2.0,4.0	bis(2-ethylhexyl)phthalate	170	J	330
S2-050750,100770-4.0,6.0	bis(2-ethylhexyl)phthalate	210	J	330
S2-050800,098150-0.0,7.0	Di-n-octyl Phthalate	230	J	330

J - DETECTED BELOW REQUIRED DETECTION LIMIT

CHEMSOIL/TXTJOANN

APPENDIX C

DETECTED SEMIVOLATILE COMPOUNDS

SAMPLING LOCATION	PARAMETER	CONC. ug/kg	COMM.	DETECTION LIMITS
S2-050810,100770-GRAB	bis(2-ethylhexyl)phthalate	290	J	330
S2-050830,098410-0.0,1.0	Fluoranthene	33	J	330
S2-050830,098410-0.0,1.0	2-Methylnaphthalene	866		330
S2-050830,098410-0.0,1.0	Phenanthrene	67	J	330
S2-050830,098410-0.0,1.0	2,4-Dimethyphenol	33	J	330
S2-050830,098410-0.0,1.0	Pyrene	100	J	330
S2-050980,100420-0.0,0.5	Benzoic Acid	40	J	1600
S2-050980,100420-0.0,0.5	bis(2-ethylhexyl)phthalate	40	J	330
S2-051000,099000-0.0,7.0	bis(2-ethylhexyl)phthalate	230	J	330
S2-051000,099000-0.0,7.0	Di-n-butylphthalate	33	J	330
S2-051000,099000-8.0,15.0	Di-n-butylphthalate	200	J	330
S2-051000,099000-8.0,15.0	bis(2-ethylhexyl)phthalate	300	J	330
S2-051280,100750-8.0,15.0	bis(2-ethylhexyl)phthalate	50	J	330
S2-051350,099000-0.0,7.0	bis(2-ethylhexyl)phthalate	330		330
S2-051350,099000-0.0,7.0	Di-n-butylphthalate	67	J	330
S2-051350,99000-8.0,15.0	bis(2-ethylhexyl)phthalate	430		330
S2-051350,99000-8.0,15.0	Di-n-butylphthalate	67	J	330
S2-051450,098850-0.0,7.0	Di-n-octyl Phthalate	180	J	330
S2-051450,098850-8.0,15.0	Diethylphthalate	42	J	330
S2-051500,100020-0.0,7.0-DU	Fluoranthene	40	J	330
S2-051500,100020-0.0,7.0-DU	Pyrene	50	J	330
S2-051500,100020-0.0,7.0-DU	Chrysene	90	J	330
S2-051500,100020-0.0,7.0-DU	Benzo(a)anthracene	50	J	330
S2-051500,101150-0.0,7.0	bis(2-ethylhexyl)phthalate	40	J	330
S2-051720,098780-0.0,7.0	bis(2-ethylhexyl)phthalate	300	J	330
S2-051720,098780-0.0,7.0	Di-n-butylphthalate	33	J	330
S2-051720,098780-8.0,15.0	Di-n-butylphthalate	33	J	330
S2-051720,098780-8.0,15.0	bis(2-ethylhexyl)phthalate	530	J	330
S2-051770,100430-0.0,7.0	Pyrene	70	J	330
S2-051770,100430-0.0,7.0	Fluoranthene	70	J	330
S2-051770,100430-0.0,7.0	Benzo(a)anthracene	50	J	330
S2-051770,100430-0.0,7.0	Chrysene	60	J	330
S2-051770,100430-0.0,7.0	Di-n-butylphthalate	4700		330
S2-051800,100000-0.0,7.0	Butyl Benzyl Phthalate	50	J	330
S2-051970,100520-0.0,1.5	bis(2-ethylhexyl)phthalate	50	J	330
S2-052150,099150-0.0,7.0	bis(2-ethylhexyl)phthalate	50	J	330
S2-052250,100725-0.0,7.0	Fluoranthene	50	J	330
S2-052250,100725-0.0,7.0	Pyrene	80	J	330

J - DETECTED BELOW REQUIRED DETECTION LIMIT

CHEMSOIL/TXTJOANN

APPENDIX D
ELEVATED METALS RESULTS

WSOW METALS RESULTS

BOREHOLE NUMBER	WSSRAP ID	CONCENTRATION UG/G	PARAMETER
C-1	S2-049370,100740-0.0,2.0	5990.15	Magnesium
C-2	S2-049425,100725-12.0,14.0	138.00	LEAD
C-2	S2-049425,100725-6.0,8.0	42803.64	IRON
C-8	S2-049635,100850-10.0,12.0	10306.69	Magnesium
C-8	S2-049635,100850-12.0,14.0	35622.72	IRON
C-8	S2-049635,100850-18.0,20.0	45672.88	IRON
C-8	S2-049635,100850-2.0,4.0	851.41	BARIUM
C-11	S2-050055,101215-2.0,4.0	1712.09	BARIUM
C-16	S2-050500,100950-14.0,16.0	40193.10	Aluminum
C-16	S2-050500,100950-18.0,20.0	30806.99	Aluminum
C-16	S2-050500,100950-20.0,22.0	30054.48	Aluminum
C-16	S2-050500,100950-2.0,4.0	28333.90	Aluminum
C-18	S2-050550,100950-2.0,4.0	27796.90	Aluminum
C-18	S2-050550,100950-4.0,6.0	30386.42	Aluminum
C-18	S2-050600100950-14.0,16.0	564.66	BARIUM
C-21	S2-050760,100150-0.0,2.0	15003.09	BARIUM
C-21	S2-050760,100150-10.0,12.0	32761.04	Aluminum
C-22	S2-050785,100120-4.0,6.0	33209.75	Aluminum
C-25	S2-050850,100100-0.0,2.0	31138.47	Aluminum
C-25	S2-050850,100100-6.0,8.0	29160.95	Aluminum
C-28	S2-051285,99990-6.0,8.0	954.99	BARIUM
C-30	S2-051400,100450-6.0,7.0	17918.35	Magnesium
C-31	S2-051185,100845-0.0,2.0	28601.16	Aluminum
C-31	S2-051185,100845-6.0,8.0	30826.44	Aluminum
C-32	S2-051220,100860-8.0,10.0	29621.26	Aluminum
C-34	S2-051280,100890-0.0,2.0	21537.77	Magnesium
C-35	S2-051320,100875-0.0,2.0	6254.41	Magnesium
C-39	S2-052220,100750-2.0,4.0	180.23	LEAD
C-39	S2-052220,100750-8.0,10.0	43374.80	IRON
C-40	S2-052200,100725-10.0,12.0	29959.64	Aluminum
C-40	S2-052200,100725-10.0,12.0	35510.14	IRON
C-40	S2-052200,100725-8.0,10.0	47796.00	IRON
C-41	S2-052116,100760-0.0,2.0	2369.88	LEAD
C-41	S2-052116,100760-18.0,20.0	96.78	LEAD
C-43	S2-052135,100710-14.0,16.0	39163.20	IRON
C-44	S2-051815,100360-2.0,4.0	121.52	LEAD
C-44	S2-051815,100360-2.0,4.0	82718.72	IRON
C-47	S2-051800,100265-0.0,2.0	97.78	LEAD
C-49	S2-051225,98775-6.0,8.0	34715.88	Aluminum
C-49	S2-051225,98775-8.0,10.0	645.70	BARIUM
C-50	S2-051200,98800-0.0,2.0	6253.50	Magnesium
C-50	S2-051200,98800-0.0,2.0	1469.00	BARIUM
C-50	S2-051200,98800-4.0,6.0	6809.00	Magnesium
C-50	S2-051200,98800-6.0,8.0	33525.36	Aluminum
C-51	S2-051225,98825-0.0,2.0	254.15	LEAD

WSOW METALS RESULTS

BOREHOLE NUMBER	WSSRAP ID	CONCENTRATION UG/G	PARAMETER
C-51	S2-051225,98825-4.0,6.0	1560.34	BARIUM
C-52	S2-051642,98925-4.0,6.0	9020.82	BARIUM
C-54	S2-051322,98950-2.0,4.0	544.18	BARIUM
C-57	S2-051565,100850-0.0,2.0	19272.96	LEAD
C-60	S2-052400,101400-0.0,2.0	211.30	LEAD
C-64	S2-051400,100690-0.0,1.5	37460.12	IRON
C-66	S2-051275,100845-0.0,1.0	1844.75	LEAD
C-74	S2-052350,100700-0.0,1.0	121.88	LEAD
C-75	S2-049450,100870-0.0,2.0	28702.80	Aluminum

WSUFMP METALS RESULTS

BOREHOLE NUMBER	WSSRAP ID	CONCENTRATION UG/G	PARAMETER
A-1	S2-050100,100730-4.5,5.0	3272.49	SODIUM
A-1	S2-050100,100730-4.5,5.0	13525.65	CALCIUM
A-3	S2-050040,100700-0.0,0.5	14818.44	CALCIUM
A-3	S2-050040,100700-0.0,0.5	6833.74	Magnesium
A-3	S2-050040,100700-0.0,0.5	17.53	ARSENIC
A-4	S2-050240,101030-0.0,0.5	10784.25	CALCIUM
A-4	S2-050240,101030-2.0,2.5	0.13	MERCURY
A-8	S2-050125,100080-2.0,2.5	8929.42	POTASSIUM
A-8	S2-050125,100080-2.0,2.5	0.12	MERCURY
A-8	S2-050125,100080-4.5,5.0	31.9	ARSENIC
A-11	S2-050225,099850-1.0,1.5	206.36	LEAD
A-11	S2-050225,099850-1.0,1.5	9836.68	Magnesium
A-11	S2-050225,099850-2.0,2.5	2753.54	POTASSIUM
A-11	S2-050225,099850-4.5,5.0	3824.97	POTASSIUM
A-12	S2-050375,099650-0.0,0.5	2316.16	CADMIUM
A-13	S2-050075,099400-0.0,1.0	29792.18	Magnesium
A-13	S2-050075,099400-0.0,1.0	98.83	COPPER
A-13	S2-050075,099400-0.0,1.0	67244.58	CALCIUM
A-13	S2-050075,099400-2.0,2.5	9302.40	CALCIUM
A-14	S2-050225,099400-2.0,2.5	24111.53	CALCIUM
A-15	S2-050370,099110-5.5,6.0	30209.98	Aluminum
A-15	S2-050370,099110-5.5,6.0	9.82	SELENIUM
A-15	S2-050370,099110-5.5,6.0	44.41	ARSENIC
A-15	S2-050390,099175-0.0,0.5	10328.56	CALCIUM
A-15	S2-050390,099175-2.0,2.5	18380.38	Magnesium
A-15	S2-050390,099175-2.0,2.5	56221.68	CALCIUM
A-16	S2-050575,100725-0.0,0.5	82.58	NICKEL
A-16	S2-050575,100725-2.0,3.5	0.11	MERCURY
A-16	S2-050575,100725-4.5,5.0	0.18	MERCURY
A-18	S2-050550,101070-0.0,1.5	0.16	MERCURY
A-18	S2-050550,101070-2.0,2.5	0.19	MERCURY
A-19	S2-050550,101210-0.0,1.0	45.91	NICKEL
A-19	S2-050550,101210-0.0,1.0	115.53	CHROMIUM
A-19	S2-050550,101210-4.5,5.0	50.93	CHROMIUM
A-20	S2-050660,100940-0.0,1.5	44.02	CHROMIUM
A-20	S2-050660,100940-3.5,5.0	69.07	NICKEL
A-20	S2-050660,100940-3.5,5.0	122.50	CHROMIUM
A-21	S2-094800,100675-0.0,0.5	1.02	MERCURY
A-21	S2-094800,100675-0.0,0.5	9947.56	CALCIUM
A-21	S2-094800,100675-4.5,5.0	35544.60	IRON
A-22	S2-049725,100675-0.0,0.5	0.15	MERCURY
A-22	S2-049725,100675-2.0,2.5	12.01	MERCURY
A-25	S2-049775,099975-0.0,0.5	16032.77	CALCIUM
A-26	S2-049860,099340-2.0,2.5	51369.36	CALCIUM
A-28	S2-049830,099470-0.0,1.0	70.69	VANADIUM
A-28	S2-049830,099470-0.0,1.0	29.67	LITHIUM

WSUFMP METALS RESULTS (Continued)

BOREHOLE NUMBER	WSSRAP ID	CONCENTRATION UG/G	PARAMETER
A-28	S2-049830,099470-0.0,1.0	62.19	ARSENIC
A-28	S2-049830,099470-2.0,2.5	19151.22	CALCIUM
A-28	S2-049830,099470-2.0,2.5	46.31	CHROMIUM
A-28	S2-049830,099470-4.5,5.0	61.18	NICKEL
A-28	S2-049830,099470-4.5,5.0	1.38	SELENIUM
A-30	S2-050710,098350-0.0,1.0	10118.25	Magnesium
A-30	S2-050710,098350-0.0,1.0	73559.30	CALCIUM
A-30	S2-050710,098350-2.0,2.5	2058.70	POTASSIUM
A-30	S2-050710,098350-2.0,2.5	61.99	VANADIUM
A-30	S2-050710,098350-4.0,5.0	94.80	ARSENIC
A-30	S2-050710,098350-4.0,5.0	0.17	MERCURY
A-30	S2-050710,098350-4.0,5.0	2123.14	POTASSIUM
A-30	S2-050710,098350-4.0,5.0	62.25	VANADIUM
A-32	S2-050680,098410-0.0,1.0	64854.00	CALCIUM
A-32	S2-050680,098410-0.0,1.0	8190.72	Magnesium
A-32	S2-050680,098410-2.0,2.5	34410.24	Aluminum
A-32	S2-050680,098410-2.0,2.5	68.14	VANADIUM
A-32	S2-050680,098410-2.0,2.5	2474.47	POTASSIUM
A-32	S2-050680,098410-4.5,5.0	1978.18	POTASSIUM
A-33	S2-050610,098370-0.0,2.0	0.33	MERCURY
A-33	S2-050610,098370-0.0,2.0	61541.92	CALCIUM
A-33	S2-050610,098370-2.5,3.0	1792.47	POTASSIUM
A-35	S2-050560,098440-0.0,1.0	14542.36	CALCIUM
A-35	S2-050560,098440-0.0,1.0	63.24	ARSENIC
A-35	S2-050560,098440-0.0,1.0	0.19	MERCURY
A-35	S2-050560,098440-2.0,2.5	0.28	MERCURY
A-35	S2-050560,098440-4.5,5.0	0.31	MERCURY
A-36	S2-050670,098610-0.0,1.0	12219.28	CALCIUM
A-36	S2-050670,098610-0.0,1.0	0.32	MERCURY
A-36	S2-050670,098610-2.0,2.5	1.24	SELENIUM
A-36	S2-050670,098610-2.0,2.5	0.26	MERCURY
A-36	S2-050670,098610-2.0,2.5	1787.49	POTASSIUM
A-36	S2-050670,098610-4.0,5.0	0.21	MERCURY
A-37	S2-050500,100140-0.0,0.5	7.55	SELENIUM
A-37	S2-050500,100140-2.0,3.0	1.31	THALLIUM
A-37	S2-050500,100140-2.0,3.0	49.61	CHROMIUM
A-37	S2-050500,100140-2.0,3.0	9.20	SELENIUM
A-37	S2-050500,100140-4.5,5.0	11.96	SELENIUM
A-37	S2-050500,100140-4.5,5.0	51.03	CHROMIUM
A-38	S2-050500,100240-0.0,0.5	18.10	SELENIUM
A-38	S2-050500,100240-0.0,0.5	4.43	THALLIUM
A-38	S2-050500,100240-2.0,2.5	61.10	CHROMIUM
A-38	S2-050500,100240-2.0,2.5	15.90	SELENIUM
A-38	S2-050500,100240-4.5,5.0	21.12	SELENIUM
A-38	S2-050500,100240-4.5,5.0	2.81	THALLIUM
A-39	S2-050440,100170-0.0,0.5	24141.60	CALCIUM

WSUFMP METALS RESULTS (Continued)

BOREHOLE NUMBER	WSSRAP ID	CONCENTRATION UG/G	PARAMETER
A-39	S2-050440,100170-0.0,0.5	1.36	THALLIUM
A-39	S2-050440,100170-0.0,0.5	19.28	SELENIUM
A-39	S2-050440,100170-0.0,0.5	6228.18	Magnesium
A-39	S2-050440,100170-2.0,2.5	3.33	THALLIUM
A-39	S2-050440,100170-2.0,2.5	16.61	SELENIUM
A-39	S2-050440,100170-4.5,5.0	3.60	THALLIUM
A-39	S2-050440,100170-4.5,5.0	12.41	SELENIUM
A-40	S2-050440,100380-2.0,2.5	17.58	SELENIUM
A-40	S2-050440,100380-2.0,2.5	49.31	CHROMIUM
A-40	S2-050440,100380-3.5,5.0	550.99	BARIUM
A-40	S2-050440,100380-3.5,5.0	2.76	SELENIUM
A-40	S2-050440,100380-3.5,5.0	3.40	THALLIUM
A-41	S2-050440,100450-4.5,5.0	11004	Magnesium
A-42	S2-050310,100520-0.0,0.5	107694.25	CALCIUM
A-43	S2-050360,100540-0.0,0.5	11320.98	CALCIUM
A-43	S2-050360,100540-0.0,0.5	998.58	SODIUM
A-44	S2-050350,100480-0.0,1.0	55229.72	CALCIUM
A-44	S2-050350,100480-0.0,1.0	1756.96	POTASSIUM
A-45	S2-050340,100420-2.0,2.5	28.2	ARSENIC
A-45	S2-050340,100420-4.5,5.0	44.00	ARSENIC
A-45	S2-050340,100420-4.5,5.0	5058.48	BARIUM
A-45	S2-050340,100420-4.5,5.0	65.39	VANADIUM
A-45	S2-050340,100420-4.5,5.0	13.91	SELENIUM
A-46	S2-050350,100350-0.0,0.5	4832	POTASSIUM
A-46	S2-050350,100350-2.0,2.5	3695	POTASSIUM
A-46	S2-050350,100350-4.5,5.0	4660	POTASSIUM
A-47	S2-050370,099830-1.0,1.5	15140.86	CALCIUM
A-47	S2-050370,099830-3.0,4.0	27.74	ARSENIC
A-48	S2-050370,099850-1.5,2.0	21.71	ARSENIC
A-48	S2-050370,099850-3.5,4.0	40.49	ARSENIC
A-50	S2-050300,099950-2.0,2.5	1112.94	BARIUM
A-50	S2-050300,099950-2.0,2.5	17.40	ARSENIC
A-50	S2-050300,099950-4.0,5.0	35.45	ARSENIC
A-51	S2-050350,099980-0.0,1.0	31.72	ARSENIC
A-51	S2-050350,099980-2.0,2.5	22.58	ARSENIC
A-62	S2-050225,099850-1.0,1.5	74563.82	CALCIUM
A-62	S2-050225,099850-1.0,1.5	0.19	MERCURY
A-62	S2-050225,099850-1.0,1.5	247.52	COPPER
A-62	S2-050225,099850-1.0,1.5	45364.50	IRON
A-63	S2-050910,100860-GRAB	0.24	MERCURY
A-63	S2-050910,100860-GRAB	15.13	SELENIUM
A-63	S2-050910,100860-GRAB	11.46	CADMIUM
A-63	S2-050910,100860-GRAB	3598.75	LEAD
A-63	S2-050910,100860-GRAB	1543.75	BARIUM
A-65	S2-050360,100660-0.0,0.5	7126.66	BERYLLIUM
A-65	S2-050360,100660-2.0,3.5	28648.96	Aluminum

WSUFMP METALS RESULTS (Continued)

BOREHOLE NUMBER	WSSRAP ID	CONCENTRATION UG/G	PARAMETER
A-65	S2-050360,100660-4.5,5.0	33462.80	Aluminum
A-67	S2-050750,100770-0.0,2.0	6735.34	BERYLLIUM
A-67	S2-050750,100770-6.0,8.0	84.09	NICKEL
A-67	S2-050750,100770-6.0,8.0	1081.81	MERCURY
A-68	S2-049740,100970-4.0,6.0	1869.53	POTASSIUM
A-68	S2-049740,100970-8.0,10.0	1705.91	POTASSIUM
A-71	S2-050510,099530-4.0,5.5	9579.18	CALCIUM
A-71	S2-050510,099530-4.0,5.5	60.88	CHROMIUM
A-71	S2-050510,099530-6.5,7.0	54.15	VANADIUM
A-72	S2-050460,099600-1.0,2.0	2.11	MERCURY
A-72	S2-050460,099600-1.0,2.0	20864.31	CALCIUM
A-72	S2-050460,099600-3.0,4.5	52487.21	CALCIUM
A-74	S2-050980,100420-0.0,0.5	64.44	VANADIUM
A-74	S2-050980,100420-0.0,0.5	2401.14	POTASSIUM
A-74	S2-050980,100420-0.0,0.5	13472.19	CALCIUM
A-74	S2-050980,100420-2.0,2.5	2070.31	POTASSIUM
A-74	S2-050980,100420-2.0,2.5	57.86	VANADIUM
A-76	S2-049800,100620-0.0,0.5	10.24	SELENIUM
A-77	S2-049730,100040-0.0,1.5	0.23	MERCURY
A-78	S2-051970,100520-0.0,1.5	322.35	VANADIUM
A-78	S2-052350,100700-0.0,1.0	121.88	LEAD
A-79	S2-049890,100840-0.0,0.5	23458.96	CALCIUM
A-79	S2-049890,100840-4.5,5.0	60196.16	CALCIUM
A-79	S2-049890,100840-4.5,5.0	13486.44	Magnesium

RANDOM BOREHOLE METALS RESULTS

BOREHOLE NUMBER	WSSRAP ID	CONC. UG/G	PARAMETER
D-2	S2-051000,101800-0.0,7.0	37.05	ARSENIC
D-3	S2-051750,101600-0.0,7.0	26.62	ARSENIC
D-4	S2-051250,101600-0.0,7.0	40.11	COPPER
D-5	S2-050700,101600-0.0,7.0	1815.96	POTASSIUM
D-10	S2-050700,101300-0.0,7.0	0.41	MERCURY
D-13	S2-052500,101150-8.0,15.0	42.40	COBALT
D-13	S2-052500,101150-8.0,15.0	113.40	NICKEL
D-13	S2-052500,101150-8.0,15.0	87.32	ARSENIC
D-13	S2-052500,101150-8.0,15.0	33287.28	Aluminum
D-15	S2-051500,101150-0.0,7.0	38.95	ARSENIC
D-15	S2-051500,101150-8.0,15.0	30.02	ARSENIC
D-17	S2-050500,101150-8.0,15.0	0.13	MERCURY
D-17	S2-050500,101150-8.0,15.0	24323.84	CALCIUM
D-18	S2-050000,101150-0.0,7.0	15692.48	CALCIUM
D-24	S2-050500,100900-16.0,23.0	43.62	NICKEL
D-24	S2-050500,100900-8.0,15.0	28306.85	Aluminum
D-24	S2-050500,100900-8.0,15.0	52.26	THALLIUM
D-25	S2-050000,100900-8.0,15.0	2.08	SELENIUM
D-26	S2-049500,100900-8.0,15.0	57811.78	IRON
D-27	S2-052250,100725-0.0,7.0	39299.85	CALCIUM
D-29	S2-050280,100750-8.0,15.0	8.17	SELENIUM
D-29	S2-050290,100750-0.0,7.0	15.34	SELENIUM
D-29	S2-051280,100750-0.0,7.0	0.12	MERCURY
D-32	S2-049780,100730-8.0,15.0	46.81	LITHIUM
D-33	S2-049310,100740-0.0,7.0	64.90	COBALT
D-34	S2-052240,100440-8.0,15.0	0.11	MERCURY
D-35	S2-051770,100430-0.0,7.0	42665.70	IRON
D-35	S2-051770,100430-0.0,7.0	1.02	MERCURY
D-35	S2-051770,100430-8.0,15.0	65.59	NICKEL
D-35	S2-051770,100430-8.0,15.0	29770.44	Aluminum
D-36	S2-050220,100420-5.0,7.0	57.21	CHROMIUM
D-36	S2-050220,100420-5.0,7.0	0.95	MERCURY
D-37	S2-051730,100420-0.0,7.0	2380.55	COPPER
D-41	S2-052010,100320-0.0,7.0	0.16	MERCURY
D-43	S2-050970,100330-0.0,7.0	57.05	VANADIUM
D-43	S2-050970,100330-0.0,7.0	60.15	ARSENIC
D-44	S2-050500,100330-0.0,7.0	13.99	SELENIUM
D-45	S2-050000,100330-0.0,0.7	1713.27	POTASSIUM
D-45	S2-050000,100330-0.0,0.7	11938.49	CALCIUM
D-45	S2-050000,100330-0.0,0.7	34.0	ARSENIC
D-45	S2-050000,100330-8.0,15.0	29392.87	Aluminum
D-45	S2-050000,100330-8.0,15.0	11.85	MERCURY
D-45	S2-050000,100330-8.0,15.0	22.0	ARSENIC
D-46	S2-049520,100330-0.0,7.0	22.2	ARSENIC
D-50	S2-051000,100020-0.0,7.0	55.99	VANADIUM
D-50	S2-051000,100020-8.0,15.0	32423.72	Aluminum

RANDOM BOREHOLE METALS RESULTS (Continued)

BOREHOLE NUMBER	WSSRAP ID	CONC. UG/G	PARAMETER
D-51	S2-050500,100020-0.0,7.0	0.12	MERCURY
D-51	S2-050500,100020-0.0,7.0	37.82	ARSENIC
D-52	S2-050000,100020-0.0,7.0	16106.11	CALCIUM
D-56	S2-051700,100000-0.0,7.0	2283.07	POTASSIUM
D-56	S2-051700,100000-0.0,7.0	53.56	ARSENIC
D-57	S2-051250,099950-0.0,7.0	14956.18	CALCIUM
D-60	S2-049750,099900-0.0,7.0	13400	CALCIUM
D-61	S2-049250,099900-0.0,7.0	0.13	MERCURY
D-61	S2-049250,099900-0.0,7.0	2916.05	POTASSIUM
D-63	S2-051800,100000-0.0,7.0	34.23	ARSENIC
D-64	S2-051000,099650-16.0,23.0	9924.60	CALCIUM
D-64	S2-051000,099650-16.0,23.0	108.30	NICKEL
D-64	S2-051000,099650-16.0,23.0	68.31	ARSENIC
D-64	S2-051000,099650-16.0,23.0	66.67	COBALT
D-64	S2-051000,099650-16.0,23.0	645.03	BARIUM
D-67	S2-049720,099650-0.0,7.0	11529.67	CALCIUM
D-69	S2-051000,099000-8.0,15.0	0.12	MERCURY
D-69	S2-051000,099000-8.0,15.0	27883.70	Aluminum
D-71	S2-050510,099430-8.0,15.0	0.13	MERCURY
D-74	S2-051450,098850-0.0,7.0	34295.30	Aluminum
D-74	S2-051450,098850-0.0,7.0	0.39	MERCURY
D-74	S2-051450,098850-8.0,15.0	35.17	ARSENIC
D-74	S2-051450,098850-8.0,15.0	33554.60	Aluminum
D-74	S2-051450,098850-8.0,15.0	0.41	MERCURY
D-77	S2-050000,099200-0.0,7.0	31689.70	CALCIUM
D-83	S2-051300,098790-0.0,7.0	47.60	CADMIUM
D-83	S2-051300,098790-0.0,7.0	2571.03	SODIUM
D-83	S2-051300,098790-0.0,7.0	70.84	COBALT
D-83	S2-051300,098790-0.0,7.0	0.20	MERCURY
D-83	S2-051300,098790-8.0,15.0	0.12	MERCURY
D-83	S2-051300,098790-8.0,15.0	61.03	ARSENIC
D-83	S2-051300,098790-8.0,15.0	5042.69	CADMIUM
D-84	S2-050550,098790-0.0,7.0	25860.24	CALCIUM
D-88	S2-050500,098550-0.0,7.0	25565.76	CALCIUM
D-88	S2-050500,098550-0.0,7.0	0.18	MERCURY
D-88	S2-050500,098550-0.0,7.0	1705.97	POTASSIUM
D-91	S2-050800,098150-0.0,7.0	0.20	MERCURY
D-91	S2-050800,098150-0.0,7.0	14970.25	CALCIUM

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Mr. Karl J. Daubel
Environmental Coordinator,
Weldon Spring Training Area
U.S. Department of the Army
Highway 94 South, Rural Route 2
Box 226
St. Charles, MO 63303

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U.S. Department of Interior
Geological Survey, Mail Stop 200
1400 Independence Road
Rolla, MO 65401

State and Local

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St. Charles, MO 63301

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Bureau of Environmental Epidemiology
State of Missouri Department of Health
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Jefferson City, MO 65102

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Environmental Services
State of Missouri
Department of Conservation
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